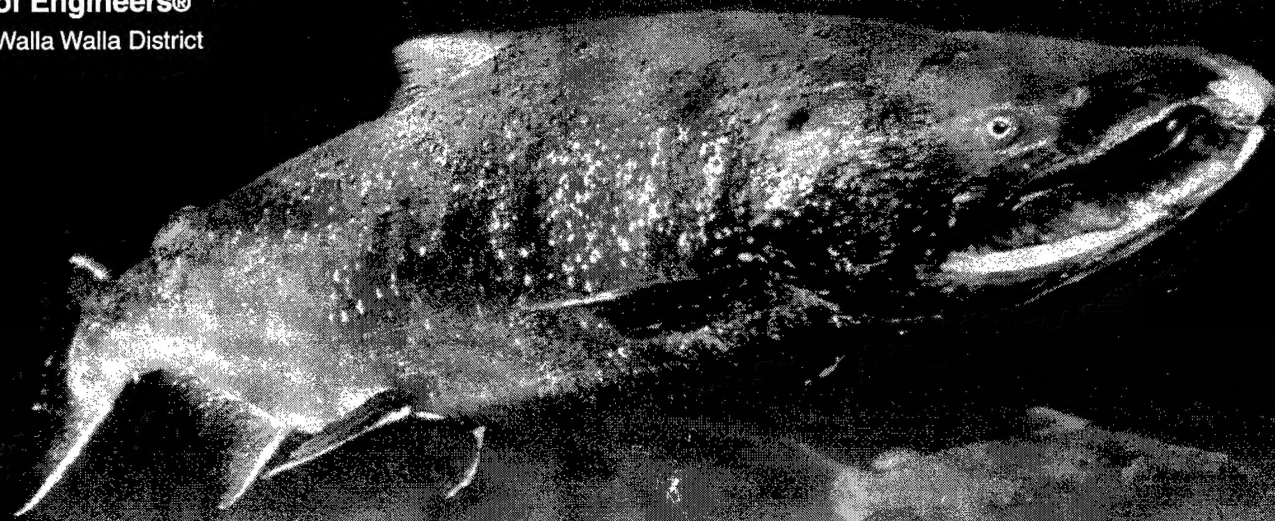




US Army Corps
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Walla Walla District



DRAFT
Lower Snake River Juvenile
Salmon Migration Feasibility Report/
Environmental Impact Statement

APPENDIX S
Snake River Maps

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December 1999

AQM01-05-0838

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
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12a. DISTRIBUTION AVAILABILITY STATEMENT Public Comment period began 17 Dec 99 and ended 30 Apr 00. Approved for public release; distribution is unlimited				12b. DISTRIBUTION CODE
13. ABSTRACT (Maximum 200 words) The Corps of Engineers along with the Bonneville Power Administration, US Environmental Protection Agency, and US Bureau of Reclamation as cooperating agencies, analyzed four general alternatives intended to provide information on the technical, environmental, and economic effects of actions related to improving juvenile salmon passage. The four alternatives include Alternative 1 - Existing Conditions (the no-action alternative) and three different ways to further improve juvenile salmon passage. The action alternatives are: Alternative 2 - Maximum Transport of Juvenile Salmon, Alternative 3 - Major System Improvements, and Alternative 4 - Dam Breaching. Comparison of the alternatives by all of the factors assessed in the study has not offered a clear-cut recommendation at this time. It is the Corps of Engineer's intent to recommend a preferred plan of action in the Final FR/EIS.				
14. SUBJECT TERMS Lower Snake River Project Endangered Species Act Fish Passage				15. NUMBER OF PAGES
				16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UL	

FEASIBILITY STUDY DOCUMENTATION

Document Title

Summary to the Lower Snake River Juvenile Salmon Migration Feasibility
Report/Environmental Impact Statement

Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact
Statement

Appendix A	Anadromous Fish
Appendix B	Resident Fish
Appendix C	Water Quality
Appendix D	Natural River Drawdown Engineering
Appendix E	Existing Systems and Major System Improvements Engineering
Appendix F	Hydrology/Hydraulics and Sedimentation
Appendix G	Hydoregulations
Appendix H	Fluvial Geomorphology
Appendix I	Economics
Appendix J	Plan Formulation
Appendix K	Real Estate
Appendix L	Lower Snake River Mitigation History and Status
Appendix M	Fish and Wildlife Coordination Act Report
Appendix N	Cultural Resources
Appendix O	Public Outreach Program
Appendix P	Air Quality
Appendix Q	Tribal Consultation/Coordination
Appendix R	Historical Perspectives
Appendix S	Snake River Maps
Appendix T	Biological Assessment
Appendix U	Clean Water Act, Section 404(b)(1) Evaluation

The documents listed above, as well as supporting technical reports and other study information, are available on our website at www.nww.usace.army.mil. Copies of these documents are also available for public review at various city, county, and regional libraries.

FOREWORD

This appendix is one part of the overall effort of the U.S. Army Corps of Engineers (Corps) to prepare the Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement (FR/EIS).

Please note that this document is a DRAFT appendix and is subject to change and/or revision based on information received through comments, hearings, workshops, etc. After the comment period ends and hearings conclude a Final FR/EIS with Appendices is planned.

The Corps has reached out to regional stakeholders (Federal agencies, tribes, states, local governmental entities, organizations, and individuals) during the development of the FR/EIS and appendices. This effort resulted in many of these regional stakeholders providing input, comments, and even drafting work products or portions of these documents. This regional input provided the Corps with an insight and perspective not found in previous processes. A great deal of this information was subsequently included in the Draft FR/EIS and Appendices, therefore, not all the opinions and/or findings herein may reflect the official policy or position of the Corps.

STUDY OVERVIEW

Purpose and Need

Between 1991 and 1997, due to declines in abundance, the National Marine Fisheries Service (NMFS) made the following listings of Snake River salmon or steelhead under the Endangered Species Act (ESA) as amended:

- sockeye salmon (listed as endangered in 1991)
- spring/summer chinook salmon (listed as threatened in 1992)
- fall chinook salmon (listed as threatened in 1992)
- steelhead (listed as threatened in 1997)

In 1995, NMFS issued a Biological Opinion on operations of the Federal Columbia River Power System. The Biological Opinion established measures to halt and reverse the declines of these listed species. This created the need to evaluate the feasibility, design, and engineering work for these measures.

The U.S. Army Corps of Engineers (Corps) implemented a study after NMFS's Biological Opinion in 1995 of alternatives associated with lower Snake River dams and reservoirs. This study was named the Lower Snake River Juvenile Salmon Migration Feasibility Study (Feasibility Study). The specific purpose and need of the Feasibility Study is to evaluate and screen structural alternatives that may increase survival of juvenile anadromous fish through the Lower Snake River Project (which includes the four lowermost dams operated by the Corps on the Snake River—Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams) and assist in their recovery.

Development of Alternatives

The Corps completed an interim report on the Feasibility Study in December 1996. The report evaluated the feasibility of drawdown to natural river levels, spillway crest, and other improvements to existing fish passage facilities. Based in part on a screening of actions conducted in the interim report, the study now focuses on four courses of action:

- Existing conditions (currently planned fish programs)
- System improvements with maximum collection and transport of juveniles (without major system improvements such as surface bypass collectors)
- System improvements with maximum collection and transport of juveniles (with major system improvements such as surface bypass collectors)
- Dam breaching or permanent drawdown to natural river levels for all reservoirs

The results of these evaluations are presented in the combined Feasibility Report (FR) and Environmental Impact Statement (EIS). The FR/EIS provides the support for recommendations that will be made regarding decisions on future actions on the Lower Snake River Project for passage of juvenile salmonids. This appendix is a part of the FR/EIS.

Geographic Scope

The geographic area covered by the FR/EIS generally encompasses the 140-mile long lower Snake River reach between Lewiston, Idaho and the Tri-Cities in Washington. The study area does slightly vary by resource area in the FR/EIS because the affected resources have widely varying spatial characteristics throughout the lower Snake River system. For example, socioeconomic effects of a permanent drawdown could be felt throughout the whole Columbia River Basin region with the most effects taking place in the counties of southwest Washington. In contrast, effects on vegetation along the reservoirs would be confined to much smaller areas.

Identification of Alternatives

Since 1995, numerous alternatives have been identified and evaluated. Over time, the alternatives have been assigned numbers and letters that serve as unique identifiers. However, different study groups have sometimes used slightly different numbering or lettering schemes and this has lead to some confusion when viewing all the work products prepared during this long period. The primary alternatives that are carried forward in the FR/EIS currently involve four major alternatives that were derived out of three major pathways. The four alternatives are:

Alternative Name	PATH ^{1/} Number	Corps Number	FR/EIS Number
Existing Conditions	A-1	A-1	1
Maximum Transport of Juvenile Salmon	A-2	A-2a	2
Major System Improvements	A-2'	A-2c	3
Dam Breaching	A-3	A-3a	4

^{1/} Plan for Analyzing and Testing Hypotheses

Summary of Alternatives

The **Existing Conditions Alternative** consists of continuing the fish passage facilities and project operations that were in place or under development at the time this Feasibility Study was initiated. The existing programs and plans underway would continue. Project operations, including all ancillary facilities such as fish hatcheries and Habitat Management Units (HMUs) under the Lower Snake River Fish and Wildlife Compensation Plan (Comp Plan), recreation facilities, power generation, navigation, and irrigation would remain the same unless modified through future actions. Adult and juvenile fish passage facilities would continue to operate.

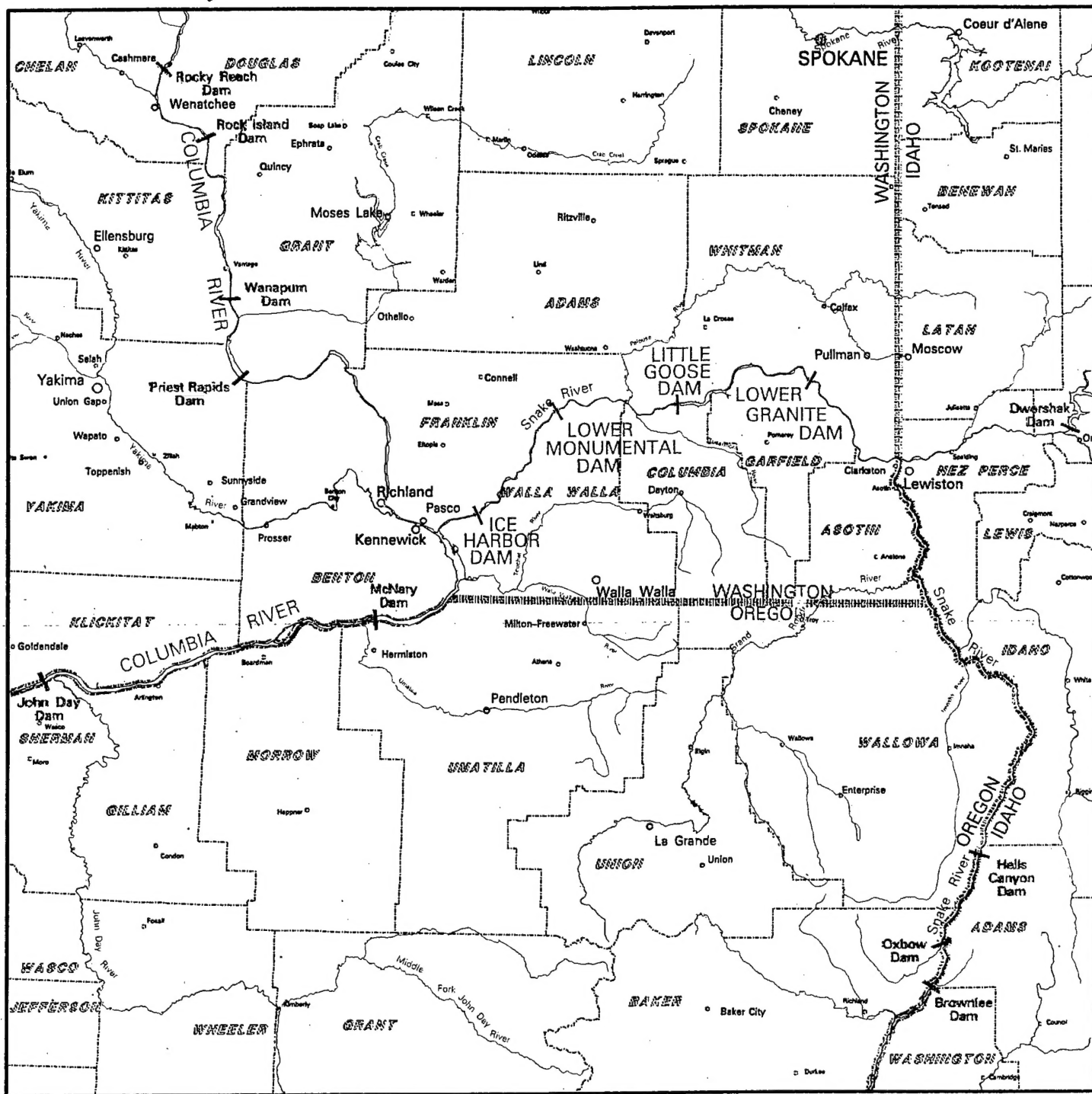
The **Maximum Transport of Juvenile Salmon Alternative** would include all of the existing or planned structural and operational configurations from the Existing Conditions Alternative. However, this alternative assumes that the juvenile fishway systems would be operated to maximize fish transport from Lower Granite, Little Goose, and Lower Monumental and that voluntary spill would not be used to bypass fish through the spillways (except at Ice Harbor). To accommodate this maximization of transport some measures would be taken to upgrade and improve fish handling facilities.

The **Major System Improvements Alternative** would provide additional improvements to what is considered under the Existing Conditions Alternative. These improvements would be focused on using surface bypass collection (SBC) facilities in conjunction with extended submersible bar screens (ESBS) and a behavioral guidance system (BGS). The intent of these facilities is to provide more effective diversion of juvenile fish away from the turbines. Under this alternative the number of fish collected and delivered to upgraded transportation facilities would be maximized at Lower Granite, the most upstream dam, where up to 90 percent of the fish would be collected and transported.

The **Dam Breaching Alternative** has been referred to as the "Drawdown Alternative" in many of the study groups since late 1996 and the resulting FR/EIS reports. These two terms essentially refer to the same set of actions. Because the term drawdown can refer to many types of drawdown, the term dam breaching was created to describe the action behind the alternative. The Dam Breaching Alternative would involve significant structural modifications at the four lower Snake River dams allowing the reservoirs to be drained and resulting in a free-flowing river that would remain unimpounded. Dam breaching would involve removing the earthen embankment sections of the four dams and then developing a channel around the powerhouses, spillways, and navigation locks. With dam breaching, the navigation locks would no longer be operational, and navigation for large commercial vessels would be eliminated. Some recreation facilities would close while others would be modified and new facilities could be built in the future. The operation and maintenance of fish hatcheries and Habitat Management Units (HMUs) would also change although the extent of change would probably be small and is not known at this time. Project development, design, and construction span a period of nine years. The first three to four years concentrate on the engineering and design processes. The embankments of the four dams are breached during two construction seasons at year 4-5 in the process. Construction work dealing with mitigation and restoration of various facilities adjacent to the reservoirs follows dam breaching for three to four years.

Authority

The four Corps dams of the lower Snake River were constructed and are operated and maintained under laws that may be grouped into three categories: 1) laws initially authorizing construction of the project, 2) laws specific to the project passed subsequent to construction, and 3) laws that generally apply to all Corps reservoirs.

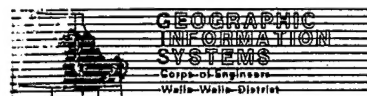
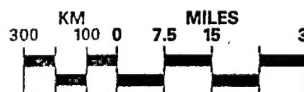
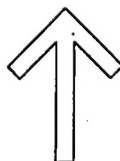


BOUNDARIES

State



County



125,000 ACRES



1 : 1,900,800

DRAFT

Lower Snake River
Juvenile Salmon Migration Feasibility Study

REGIONAL BASE MAP

ABSTRACT

This is Appendix S—Snake River Maps to the Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement. This appendix was prepared by the U.S. Army Corps of Engineers Walla Walla District. This appendix is intended to share maps and aerial photo displays of the Lower Snake River Project (LSRP). These presentations give the reader insight into the LSRP prior to dam construction (before 1961) and after dam construction (after 1975).



**US Army Corps
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Walla Walla District

Draft

**Lower Snake River Juvenile Salmon
Migration Feasibility Report/
Environmental Impact Statement**

**Appendix S
Snake River Maps**

**Produced by
U.S. Army Corps of Engineers
Walla Walla District**

Completed November 1999
Revised and released for review
with Draft FR/EIS
December 1999

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1.	Introduction	S1-1
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3.1	Survey Drawing Displays	S3-1
3.2	Pre- and Post-Dam Comparison Displays	S3-1
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Annex B	Pre- and Post-Dam Comparison Displays	

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ACRONYMS AND ABBREVIATIONS

3-D	three dimensional
dpi	dots per inch
GIS	geographic information system
LSRP	Lower Snake River Project
msl	mean sea level
RM	River Mile
USE	U.S. Engineer

1. Introduction

This appendix is intended to share maps and aerial photo displays of the Lower Snake River Project (LSRP). These presentations give the reader insight into the LSRP prior to dam construction (before 1961) and after dam construction (after 1975).

2. Mapping Products

2.1 1934 Survey Drawings

Documented surveys with depth-soundings on the LSRP were first conducted in the late 1800s. Only two depth-sounding surveys cover the entire LSRP and these were completed in 1917 and 1934. The 1934 survey was chosen for this appendix because it contains much more detail. Since 1934, depth-sounding surveys were conducted only on selected areas within the LSRP. The figures in this appendix are from the original linen drawings.

2.1.1 Type of Data

The survey drawings are a collection of 155 sheets covering 176 river miles, beginning at the mouth of the Snake River (River Mile 0.0) and were originally drawn at the scale of 1:2,000.

The 1934 drawings include the following information:

- topographic contours (5 foot)
- shoreline
- ground descriptions (grass, sand, cultivated)
- sounding depths
- depth contours (6 and 9 foot)
- proposed navigation channel centerline
- northing/easting and longitude/latitude tick marks
- U.S. Engineer (U.S.E.) bench marks
- river miles (not the same as reservoir river miles)
- roads and railroads
- substrate information
- islands
- low water elevation marks
- buildings
- rapids (average & maximum velocity)
- spot elevations
- monument stations

2.1.2 Original Purpose

The drawings are taken from a larger report entitled *Review Report, Snake River, Washington-Idaho, Mouth to Oregon-Washington Line*, dated June 10, 1935, by the U.S. Engineer Office, Portland, Oregon. Sounding data was taken to determine a proposed navigation channel, document the topography, and site locations of rapids.

2.1.3 Survey Components

The method of survey is not known because the associated report or other documentation was not found with the drawings. The original maps were prepared on linen media. Notes on the drawings identify the following creation specifics:

- Elevations are referred to as mean sea level (msl) (U.S.C & G.S. Datum 1929 adjustment).
- Soundings are in feet and tenths and show depths at adopted low water plane (based on 0.0 at U.S. Weather Bureau gage at Riparia, El 512.05 msl).
- Figures in parentheses indicate height in feet above low water (for example, 1.7).
- Contour interval is 5 feet.
- Distance in miles from mouth of river is measured on the centerline of the proposed channel.

2.1.4 Electronic Conversions and Processing

In 1998 the Walla Walla District converted the 1934 drawings to 3-D geographic information system (GIS) files. At the same time the approximately 126,000 sounding points (depth of river) were also converted into 3-D GIS files with horizontal and vertical values. The drawings were scanned at 200 dots per inch (dpi). Longitude and latitude tick mark information was taken from the drawings, inputted into files, and labeled. During data verification of the longitude and latitude tick mark locations, the tick marks were found not to match current coordinate systems, so drawings do not correctly overlay current topographic data. Images were geographically referenced into position using the longitude and latitude locations from the drawings. The raster line work was then converted into 3-D vector data with each reservoir reach as the upper and lower boundary for that section of the river.

2.2 Aerial Photography

2.2.1 1956 to 1962

Aerial photography flown between 1956 and 1962 was stereoplotted to develop topographic mapping. The topographic mapping was used to geographically reference the 1958 aerial photography that represents the pre-project condition for the LSRP. See Table 2.1 for aerial flight details.

2.2.2 1958, 1991, and 1992

Aerial photography was flown in 1958, 1991, and 1992 for the purpose of recording what the river looked like during that time period. The 1958 aerial flight documents the appearance of the lower Snake River prior to dam construction. The 1991 and 1992 flights provide information used in managing recreation areas and wildlife habitat units within the boundaries of the LSRP. See Table 2.1 for aerial flight details.

Table 2-1. Aerial Flight Information

Description	Roll Number	Date Flown	Scale	% Overlap	Control
1956 Snake River					
Snake River Mouth to Riparia	W56-52V	14 Sep	1:20,700	60	Yes
1957 Snake River					
Lake Herbert G. West	W57-70V	10 Sep	1:9,600	60	Yes
Lake Herbert G. West	W57-71V	12 Oct	1:9,600	60	Yes
1958 Snake River					
Low Water — RM 10 to Johnson Bar	W58-74V	28 Aug	1:10,000	Minimum	No
Low Water — RM 10 to Johnson Bar	W58-75V	28 Aug	1:10,000	Minimum	No
1959 Snake River					
Lake Bryan	W59-93V	2 Nov	1:9,600	60	Yes
Lake Bryan	W59-94V	6 Nov	1:9,600	60	Yes
Lake Bryan	W59-95V	14 Nov	1:20,000	60	Yes
Lake Bryan	W59-95V	30 Nov	1:20,000	60	Yes
1960 Snake River					
Lower Granite Lake—Low Altitude	W60-8	1 Dec	1:9,600	60	Yes
Lower Granite Lake—Low Altitude	W60-9	13 Dec	1:9,600	60	Yes
1991 Snake River					
RM 0.0 to Lower Monumental Dam	W91-03	30 Aug	1:24,000	60	Yes
1992 Snake River					
Lower Monumental Dam to Asotin	W92-12	19 Apr	1:24,000	60	Yes

3. Map Presentations

3.1 Survey Drawing Displays

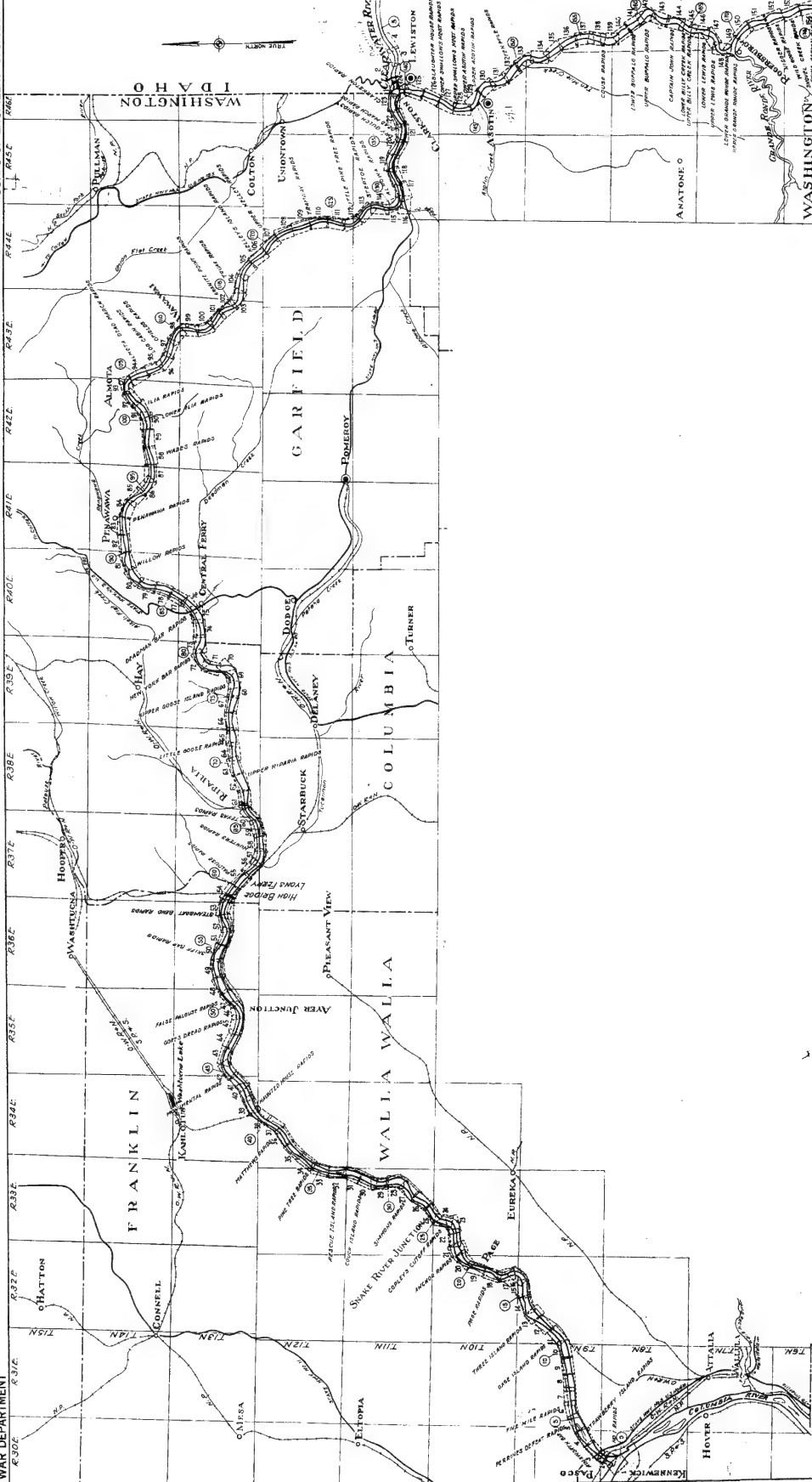
The 1934 mapping found in Annex A is a subset of the entire mapping collection. Only 131 sheets were selected to represent the LSRP, starting at the mouth of the Snake River to a point above Asotin, WA. An index map in the front of the collection helps the reader select sheets of interest.

3.2 Pre- and Post-Dam Comparison Displays

A total of 21 pre- and post-dam comparison displays have been compiled and are found in Annex B. Each display is of a particular geographic location on the lower Snake River. Aerial photography from 1958, 1991, and 1992 are compared showing pre- and post-dam shorelines along with post-dam shoreline superimposed on the 1958 photo. In addition, up to three oblique photos, taken between 1958 and 1960, are presented with a relationship to the 1958 aerial photo. For those locations where fewer than 3 photos are available, there is a blank area on the sheet. There are 6 displays from the river and reservoir between Ice Harbor and Lower Monumental Dams, 7 displays between Lower Monumental and Little Goose Dams, 8 displays between Little Goose and Lower Granite Dams, and one display from Lower Granite Dam to Clarkston.

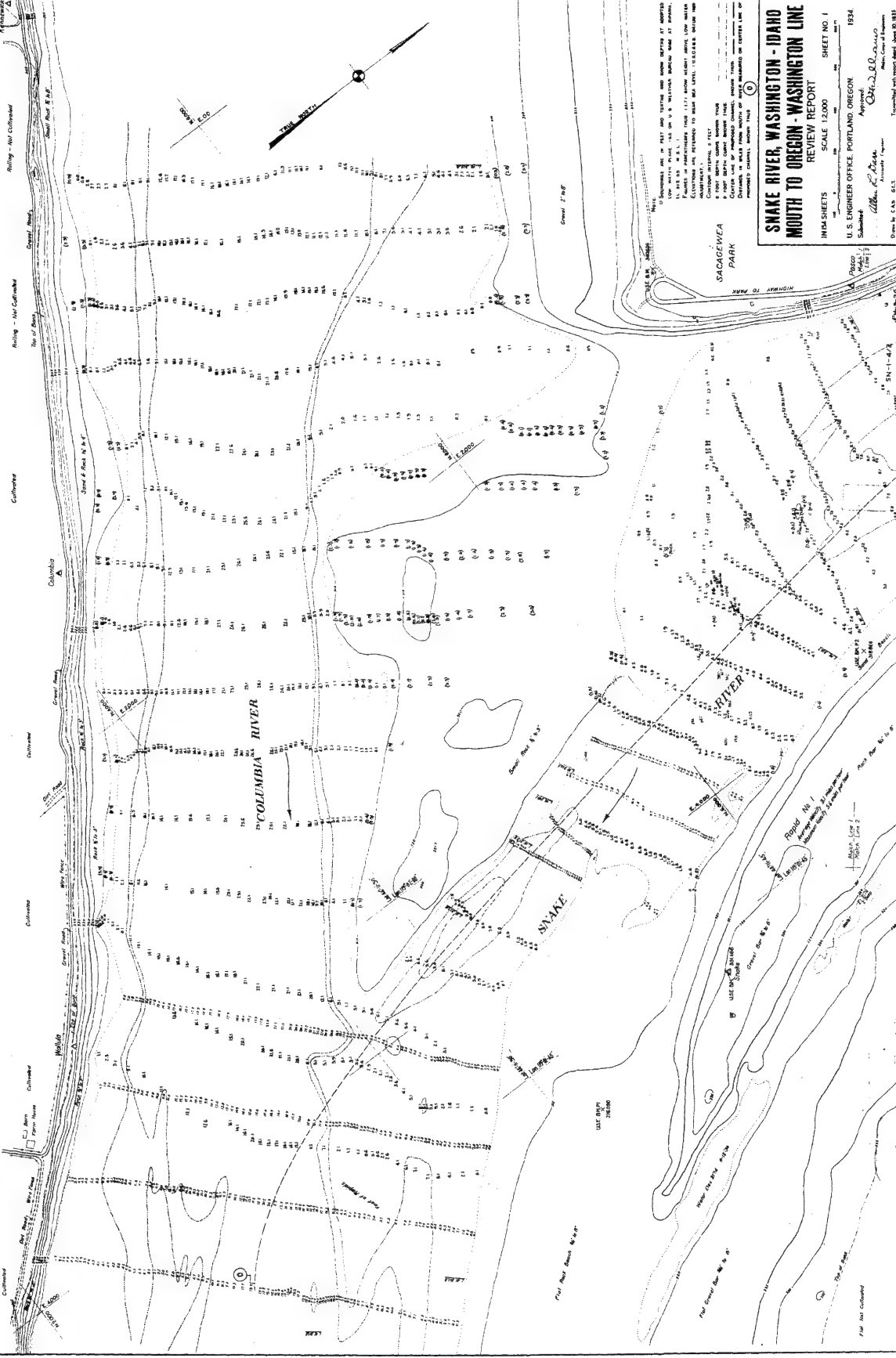
Annex A

**1934 SURVEY DRAWINGS:
SHEET NUMBERS 1 THROUGH 131 AND OVERVIEW SHEET**

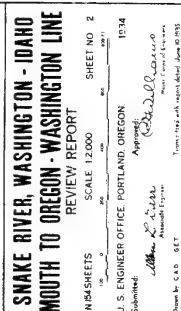


Snake River, Washington - Idaho
Mouth to Oregon - Washington Line
INDEX MAP

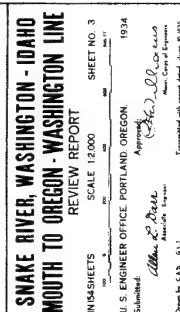
U. S. ENGINEER OFFICE PORTLAND, OREGON
1934
Approved: *W. C. Davis*
Checked: *W. C. Davis*
Drawn by: *W. C. Davis*
Published with report dated June 10, 1933
SN-1-1270



Snake River, Washington - Idaho
MOUTH TO OREGON - WASHINGTON LINE
REVIEW REPORT
IN 4 SHEETS SCALE 12,000 SHEET NO. 1
U. S. ENGINEER OFFICE PORTLAND OREGON 1934
Submitted: *Allen L. Dine*
Approved: *Allen L. Dine*
Checked: *Allen L. Dine*
Drawn by: C.A.B. 613



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CORRELATION INTERVAL, 5 FEET

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6 FOOT DEPTH CURVE SHOWS THICK

CENTER LINE OF PROPOSED CHANNEL SHOWS THICK

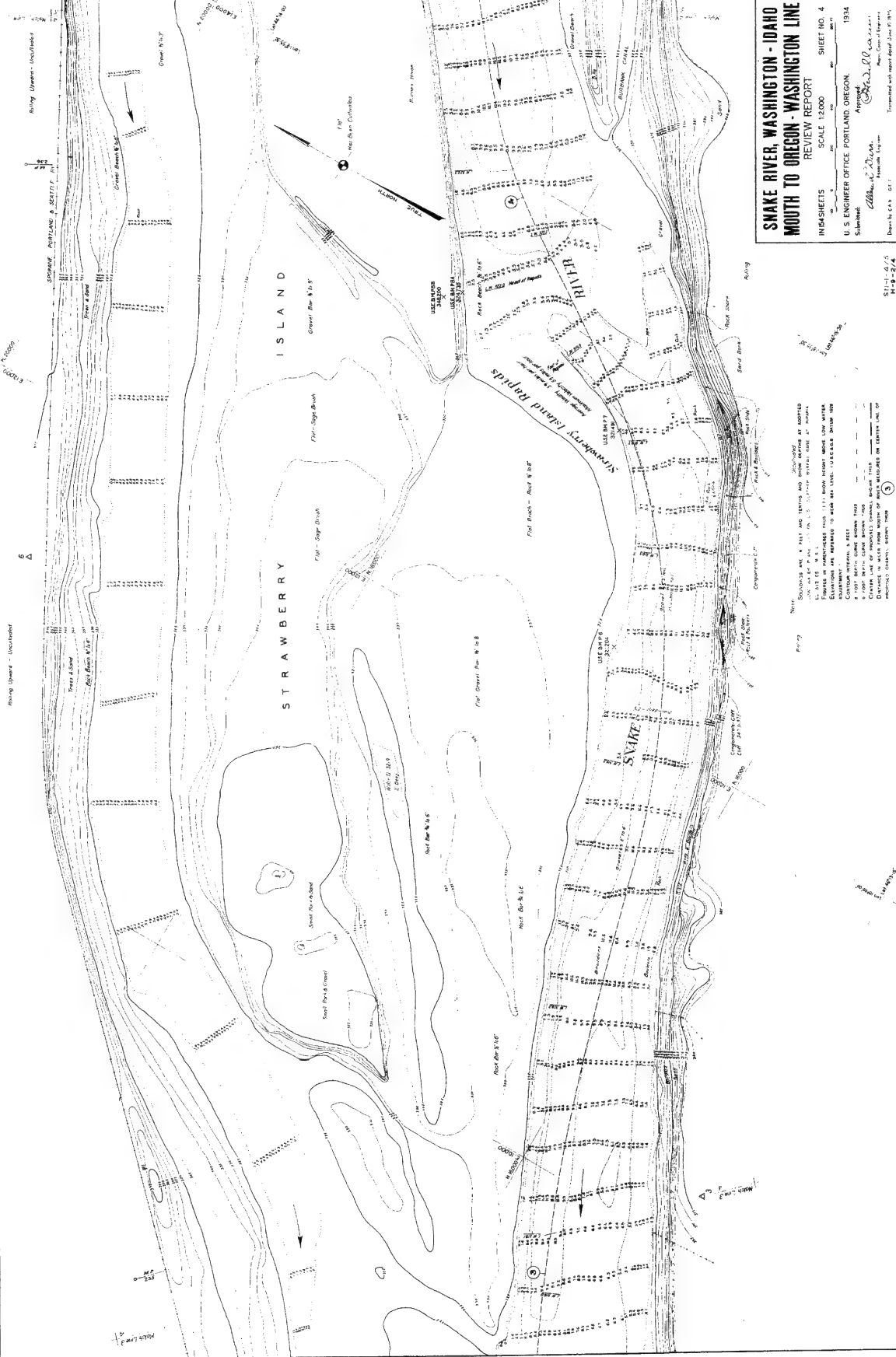
DISTANCE IN FEET FROM MOUTH OF

PROPOSED CHANNEL SHOWS THICK

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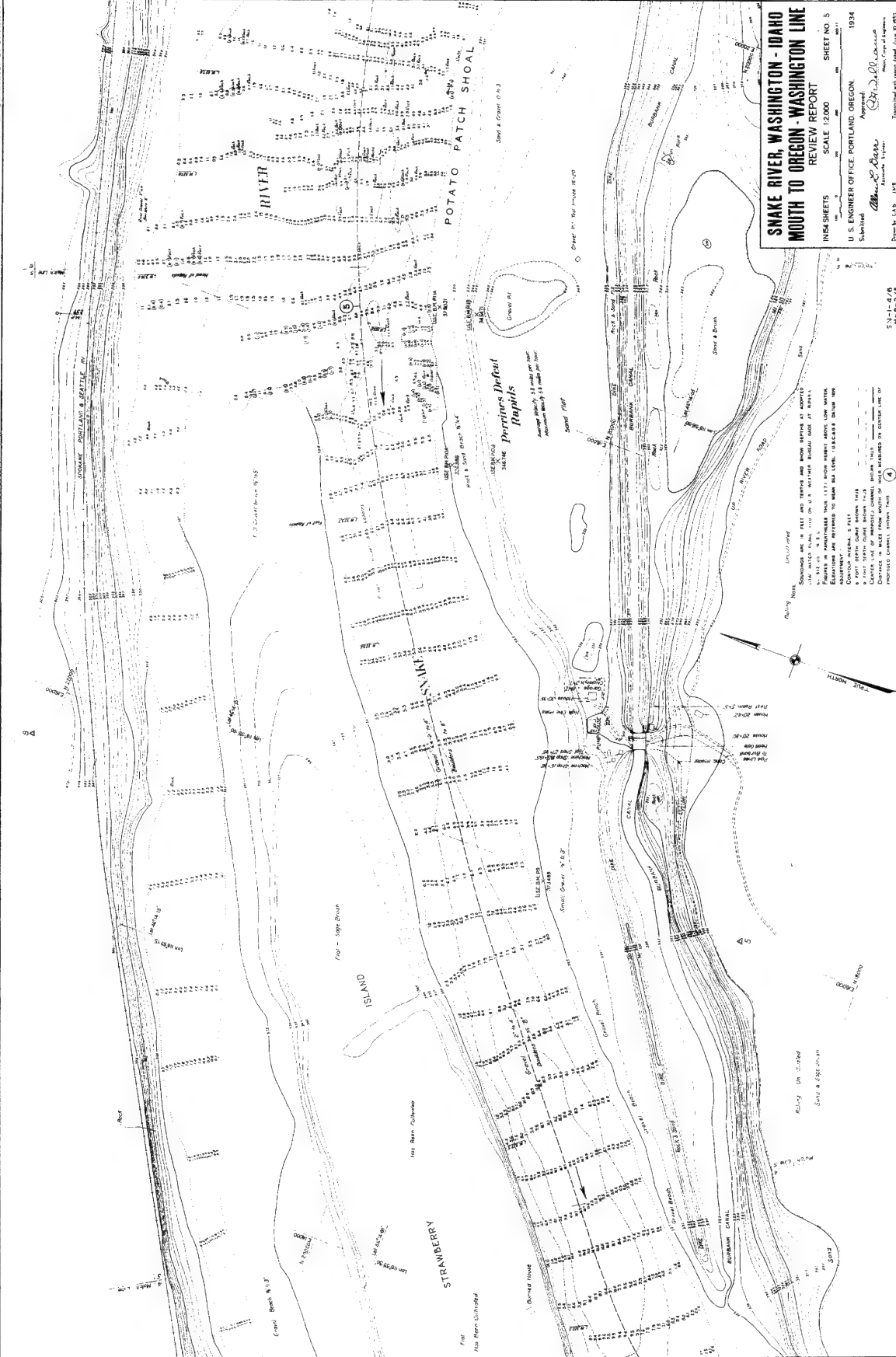
SN-1-4/4

SN-1-1273



Snake River, Washington - Idaho
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Notes:
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 78. The map is a plan and section map and is not a topographic map.
 79. The map is a plan and section map and is not a topographic map.
 80. The map is a plan and section map and is not a topographic map.
 81. The map is a plan and section map and is not a topographic map.
 82. The map is a plan and section map and is not a topographic map.
 83. The map is a plan and section map and is not a topographic map.
 84. The map is a plan and section map and is not a topographic map.
 85. The map is a plan and section map and is not a topographic map.
 86. The map is a plan and section map and is not a topographic map.
 87. The map is a plan and section map and is not a topographic map.
 88. The map is a plan and section map and is not a topographic map.
 89. The map is a plan and section map and is not a topographic map.
 90. The map is a plan and section map and is not a topographic map.
 91. The map is a plan and section map and is not a topographic map.
 92. The map is a plan and section map and is not a topographic map.
 93. The map is a plan and section map and is not a topographic map.
 94. The map is a plan and section map and is not a topographic map.
 95. The map is a plan and section map and is not a topographic map.
 96. The map is a plan and section map and is not a topographic map.
 97. The map is a plan and section map and is not a topographic map.
 98. The map is a plan and section map and is not a topographic map.
 99. The map is a plan and section map and is not a topographic map.
 100. The map is a plan and section map and is not a topographic map.



Snake River, Washington - Idaho Mouth to Oregon - Washington Line

REVIEW REPORT

IN 54 SHEETS SCALE 12,000 SHEET NO. 5

U. S. ENGINEER OFFICE PORTLAND, OREGON

Submitted: *[Signature]* Approved: *[Signature]*

Drawn by: L. A. B. 148

Transmitted with report dated June 10, 1915

SN-1-1275

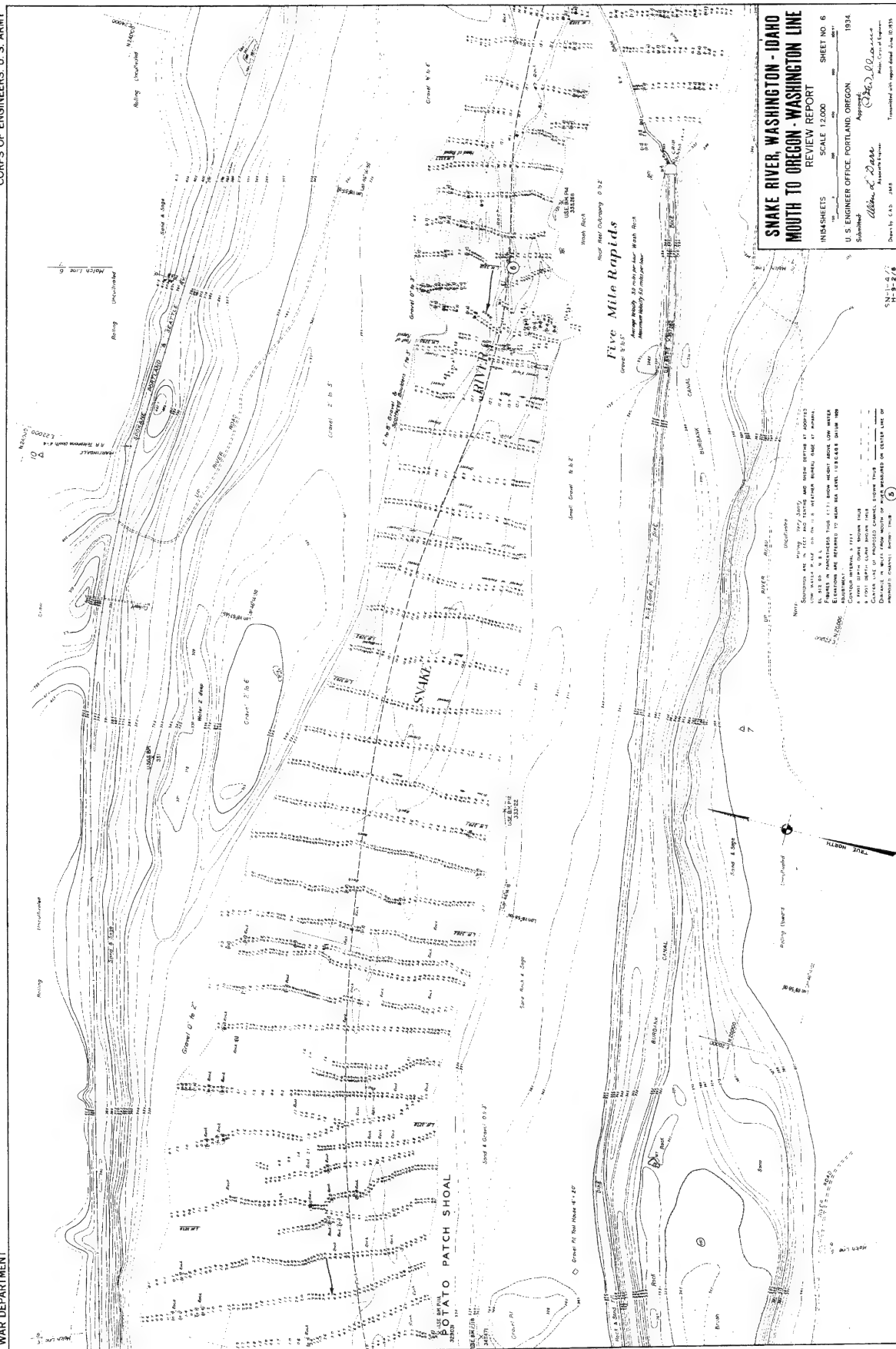
NOTES

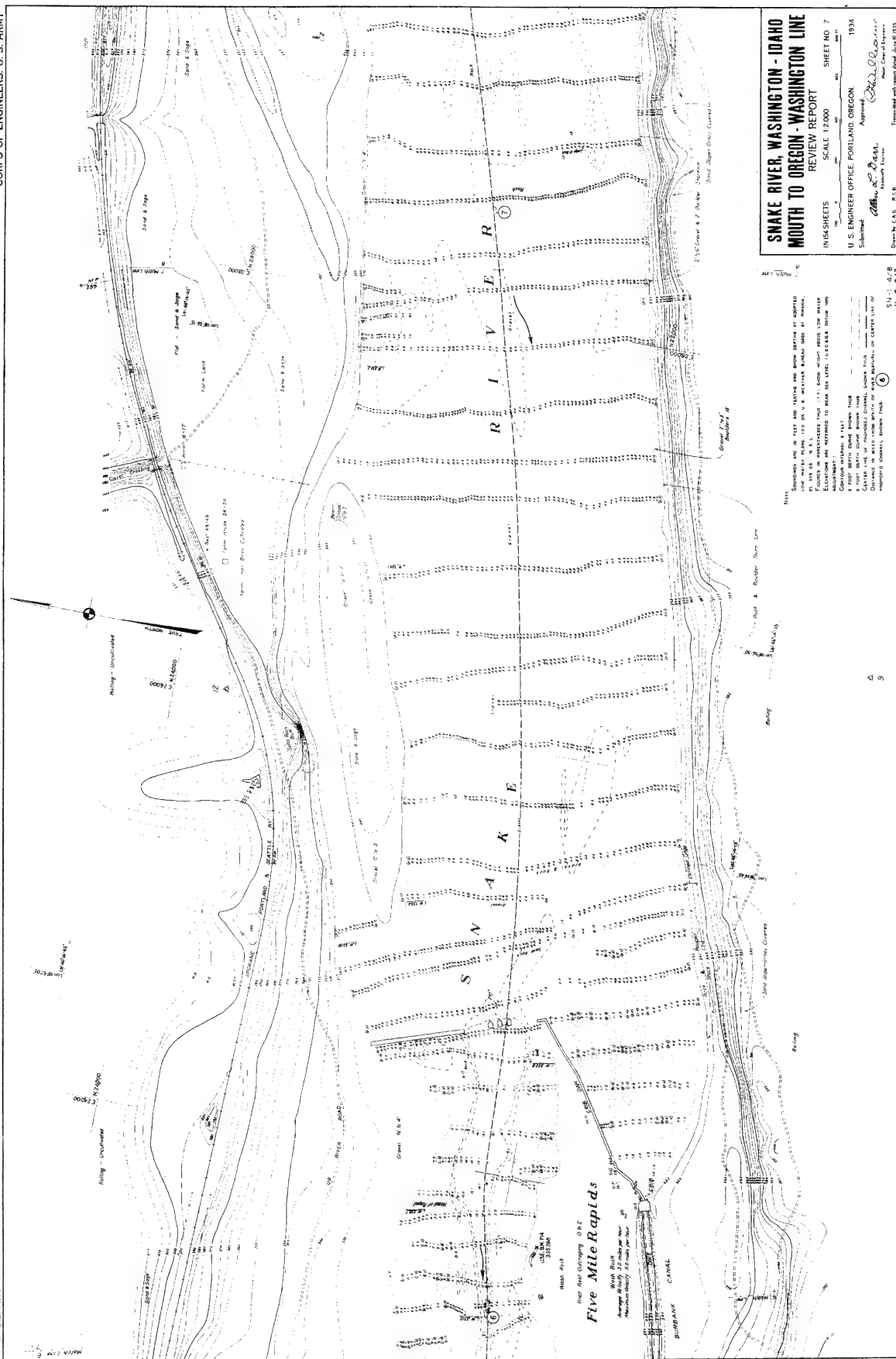
1. SLOPES ARE IN FEET AND TENTHS AND SHOW EXCEPT AS NOTED.

2. ALL DISTANCES ARE IN FEET AND TENTHS EXCEPT AS NOTED.

3. ELEVATIONS ARE IN FEET AND TENTHS EXCEPT AS NOTED.

4. DISTANCES IN ACRES AND MILES ARE AS MEASURED ON CURVE LINE OF PROPOSED CANALS, SHOWING TRUE.





SNAKE RIVER, WASHINGTON - IDAHO
 MOUTH TO OREGON - WASHINGTON LINE

IN 154 SHEETS SCALE 1:2,000 SHEET NO. 7

U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934

Submitted: _____ Approved: _____
U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934

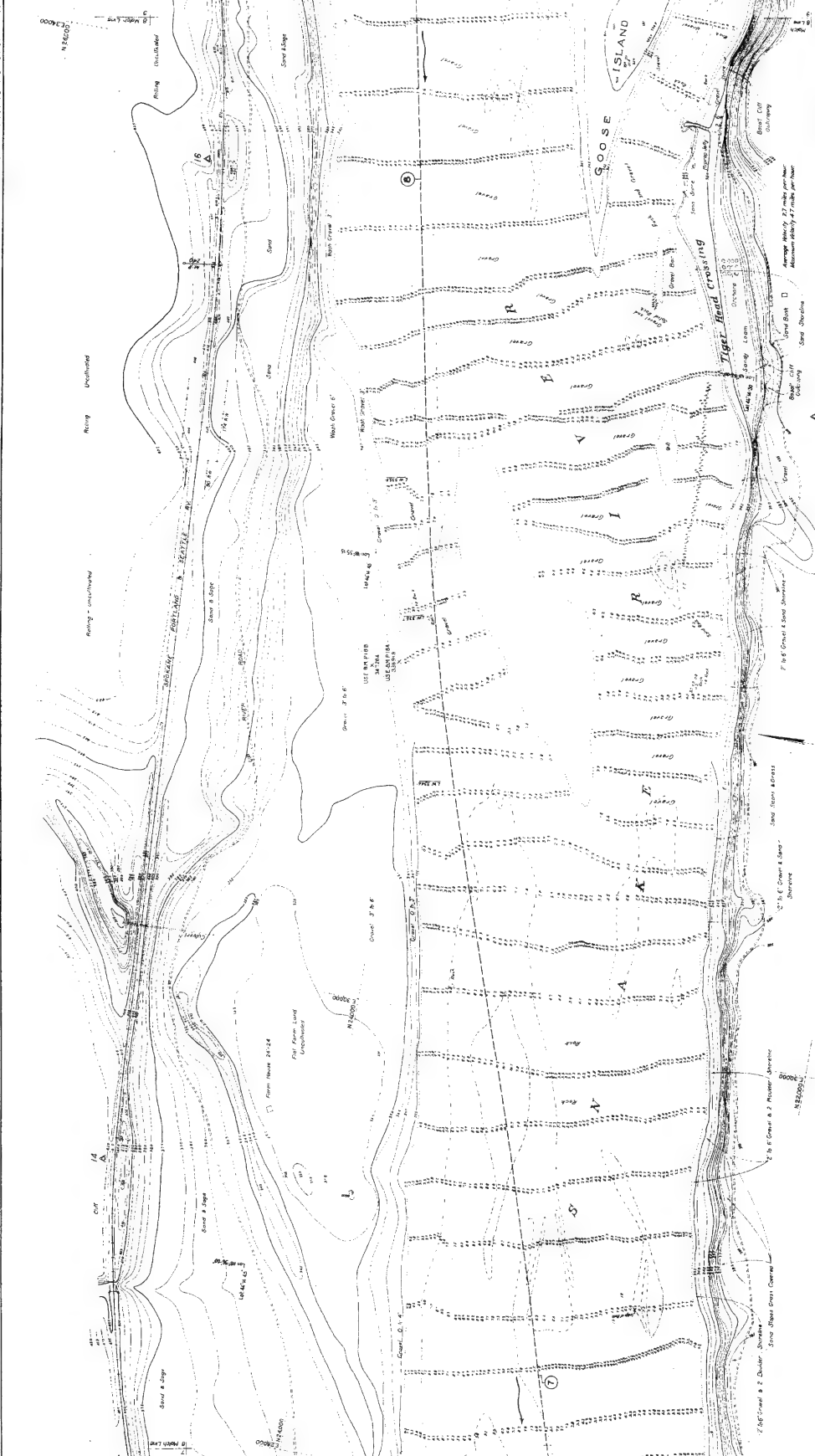
Allen L. Dan
 Signature: *Allen L. Dan*

Associate Engineer
 Major, Corps of Engineers
 Transferred with permanent assignment to USARV

Drawn by C.A.D. R.C.B.
Transcribed with report dated June 10 1935

SN-1-12/7

SN-1-1217

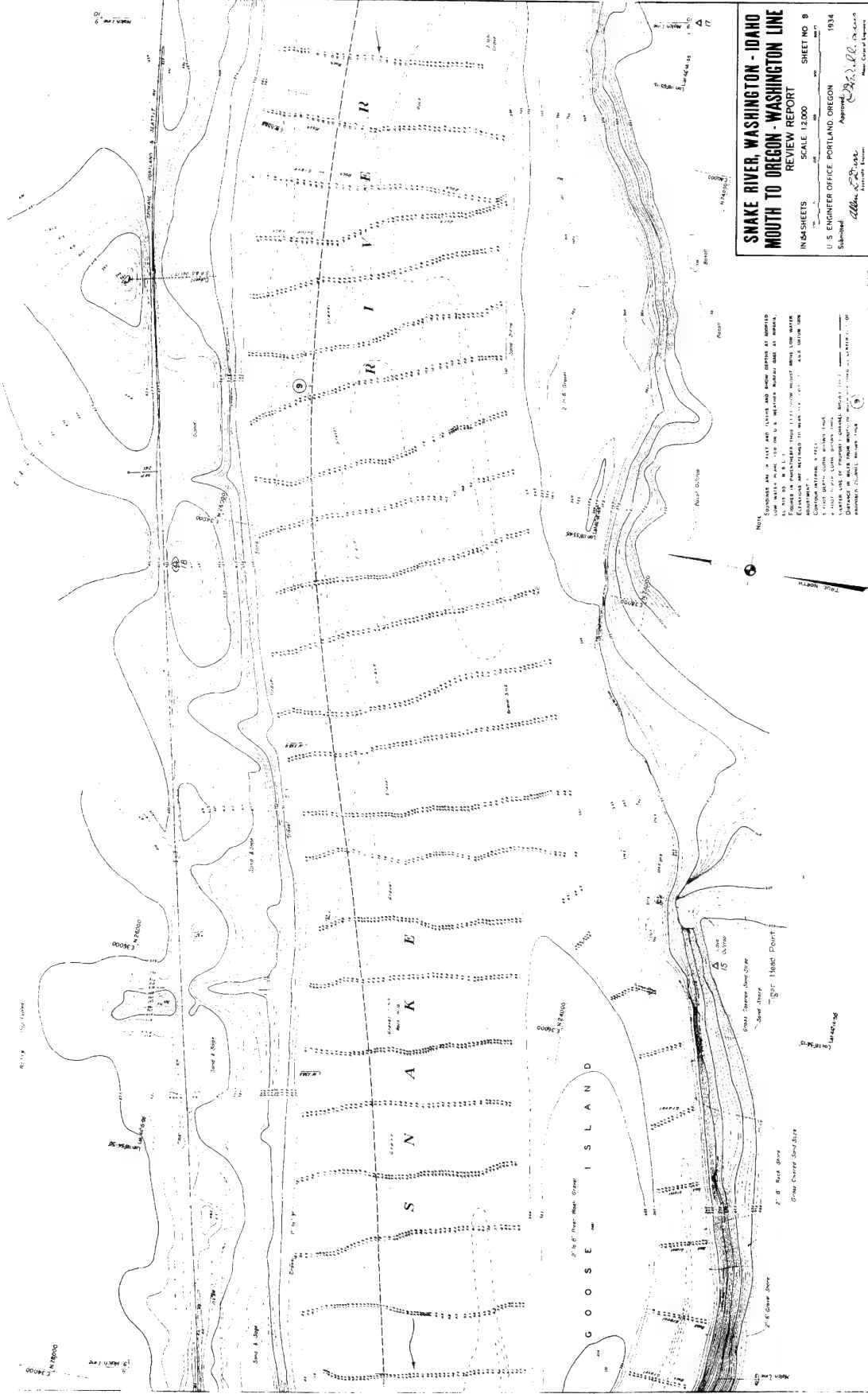


Snake River, Washington - Idaho
Mouth to Oregon - Washington Line
REVIEW REPORT

IN 54 SHEETS SCALE 1:50,000 SHEET NO. 8

U. S. ENGINEER OFFICE PORTLAND, OREGON
Submitted: *[Signature]* Approved: *[Signature]* 1934
Author: *[Signature]* Reviewing Engineer: *[Signature]*
Drawn by: C. A. B. 3 M.B. Transmitted with report dated June 10 1934
NY 9-278

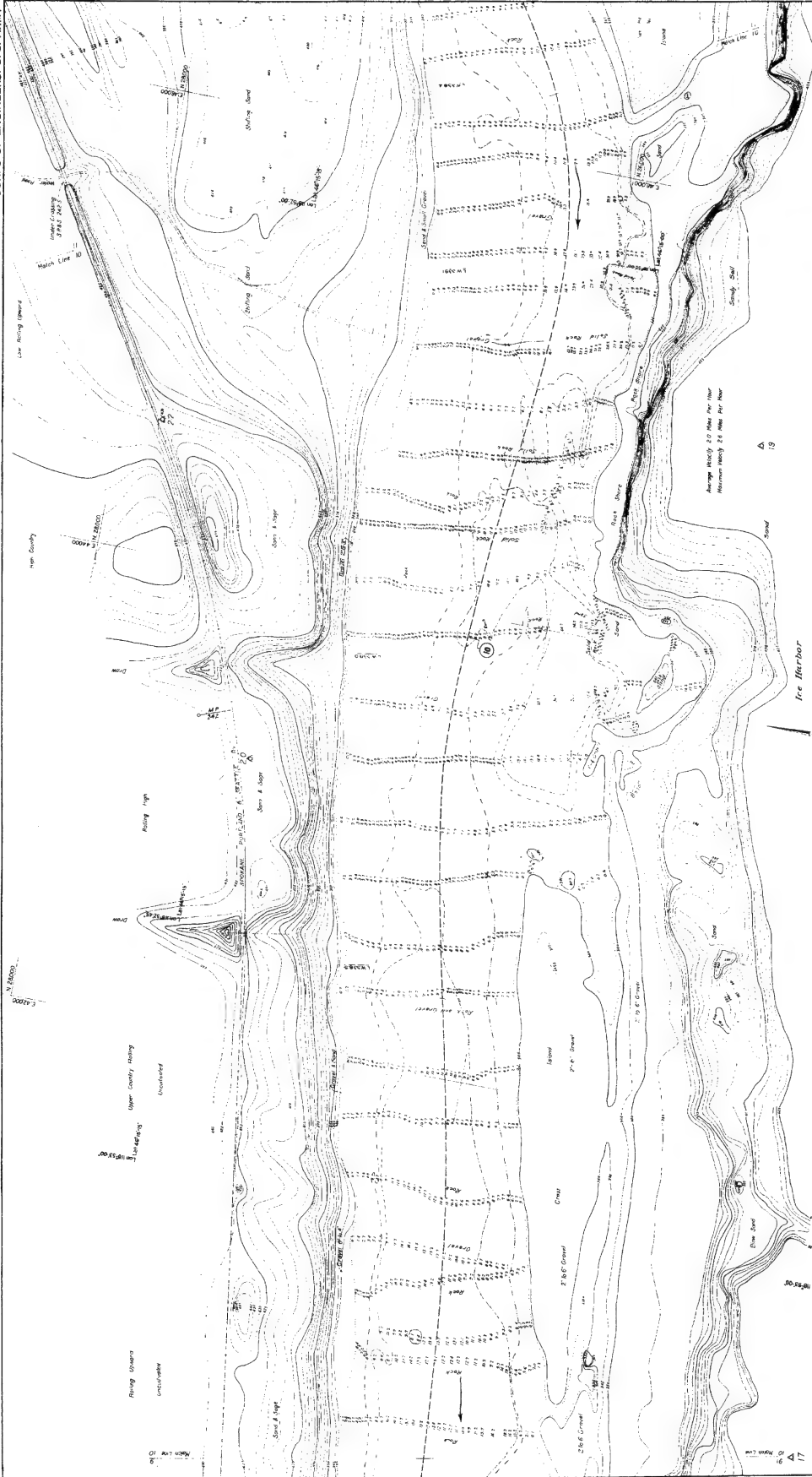
Notes:
1. Soundings are in feet and tenths and were referred to adopted low water plane 190 on U. S. vertical datum and at mean high water.
2. Elevation in parentheses from 1911 mean high water low water.
3. Elevation are referred to mean sea level 1.851.685 datum 1929.
4. Contour interval, 5 feet.
5. Foot bridge shown across river.
6. Curve line of proposed channel shown.
7. Proposed line of channel shown.
8. Proposed line of channel shown.
9. Proposed line of channel shown.
10. Proposed line of channel shown.
11. Proposed line of channel shown.
12. Proposed line of channel shown.
13. Proposed line of channel shown.
14. Proposed line of channel shown.
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94. Proposed line of channel shown.
95. Proposed line of channel shown.
96. Proposed line of channel shown.
97. Proposed line of channel shown.
98. Proposed line of channel shown.
99. Proposed line of channel shown.
100. Proposed line of channel shown.



Snake River, Washington - Idaho Mouth to Oregon, Washington Line
REVIEW REPORT
 INDSHEETS SCALE 1:2000 SHEET NO 9
 U. S. ENGINEER OFFICE PORTLAND, OREGON
 Submitted *Allen L. Stone* Approved *W. H. L. Stone*
 1934
 Prepared by *W. H. L. Stone*
 Checked by *W. H. L. Stone*
 Drawn by *W. H. L. Stone*
 Printed by *W. H. L. Stone*

NOTES
 1. ELEVATIONS ARE IN FEET AND FEET AND INCHES ARE SHOWN AS DECIMALS OF A FOOT.
 2. ELEVATIONS ARE BASED ON THE MEAN SEA LEVEL DATUM.
 3. ELEVATIONS ARE BASED ON THE MEAN SEA LEVEL DATUM.
 4. ELEVATIONS ARE BASED ON THE MEAN SEA LEVEL DATUM.
 5. ELEVATIONS ARE BASED ON THE MEAN SEA LEVEL DATUM.
 6. ELEVATIONS ARE BASED ON THE MEAN SEA LEVEL DATUM.
 7. ELEVATIONS ARE BASED ON THE MEAN SEA LEVEL DATUM.
 8. ELEVATIONS ARE BASED ON THE MEAN SEA LEVEL DATUM.
 9. ELEVATIONS ARE BASED ON THE MEAN SEA LEVEL DATUM.

SN-1-1279



**SNAKE RIVER, WASHINGTON - IDAHO
MOUTH TO OREGON - WASHINGTON LINE
REVIEW REPORT**

150 0 100 200 300 400 500 600 FT
 SCALE 1:2,000
 SHEET NO. 10
 1934
 U. S. ENGINEER OFFICE, PORTLAND, OREGON.
 Submitted: _____
 Approved: *W. J. ...*

Almon L. Damm
Associate Engineer
(Signature)
Major, Corps of Engineers

01/21-1-NS
SN-1-12/10

SOUNDINGS ARE IN FEET AND TIDEING AND SHOW DEPTHS AT ADJUSTED LOW WATER PLANE. 5.0 ON S = WEATHER STATION CODE AT STATION. FIGURES IN PARENTHESES INDICATE LOWEST AVERAGE LOW WATER. ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL. U.S.C.G.S. DATUM 1983.

ADJUSTMENT: _____

CORRECTION INTERVAL: 5 FEET.

8 FOOT DEPTHS: _____

10 FOOT DEPTHS: _____

15 FOOT DEPTHS: _____

CENTER LINE OF PROPOSED CHANNEL: _____

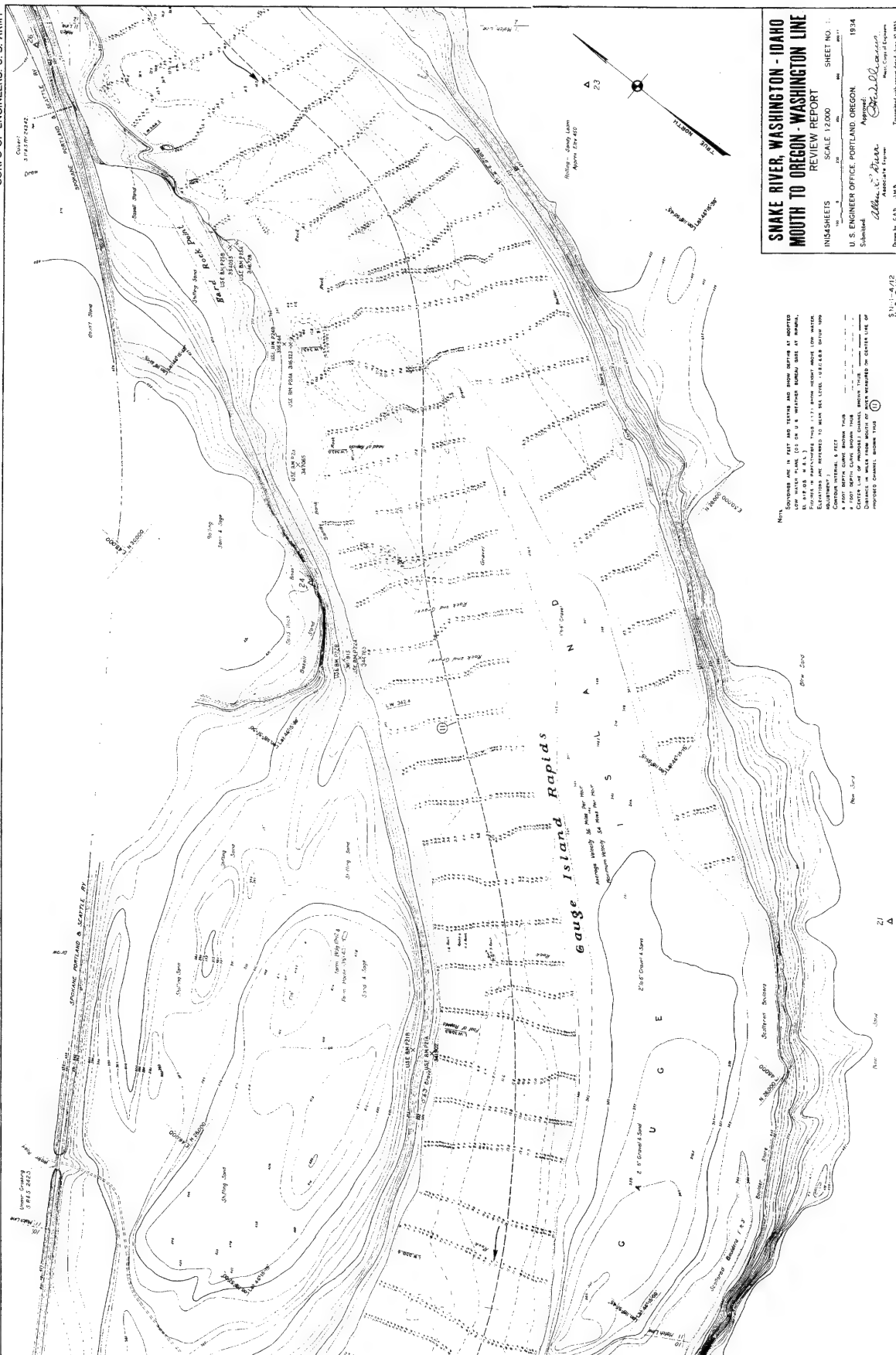
DEPTHS IN WILDER BAY MOUTH OF RIVER MEASURED ON CENTER LINE OF PROPOSED CHANNEL: _____

DEPTHS IN WILDER BAY MOUTH OF RIVER MEASURED ON CENTER LINE OF PROPOSED CHANNEL: _____

(10)

115

H-9



**Snake River, Washington - Idaho
Mouth to Oregon - Washington Line**

SHOOTING TO UPLIFT WASHINGTON STATE REVIEW REPORT

INIS4 SHEETS SCALE 1:2,000 SHEET NO. 11

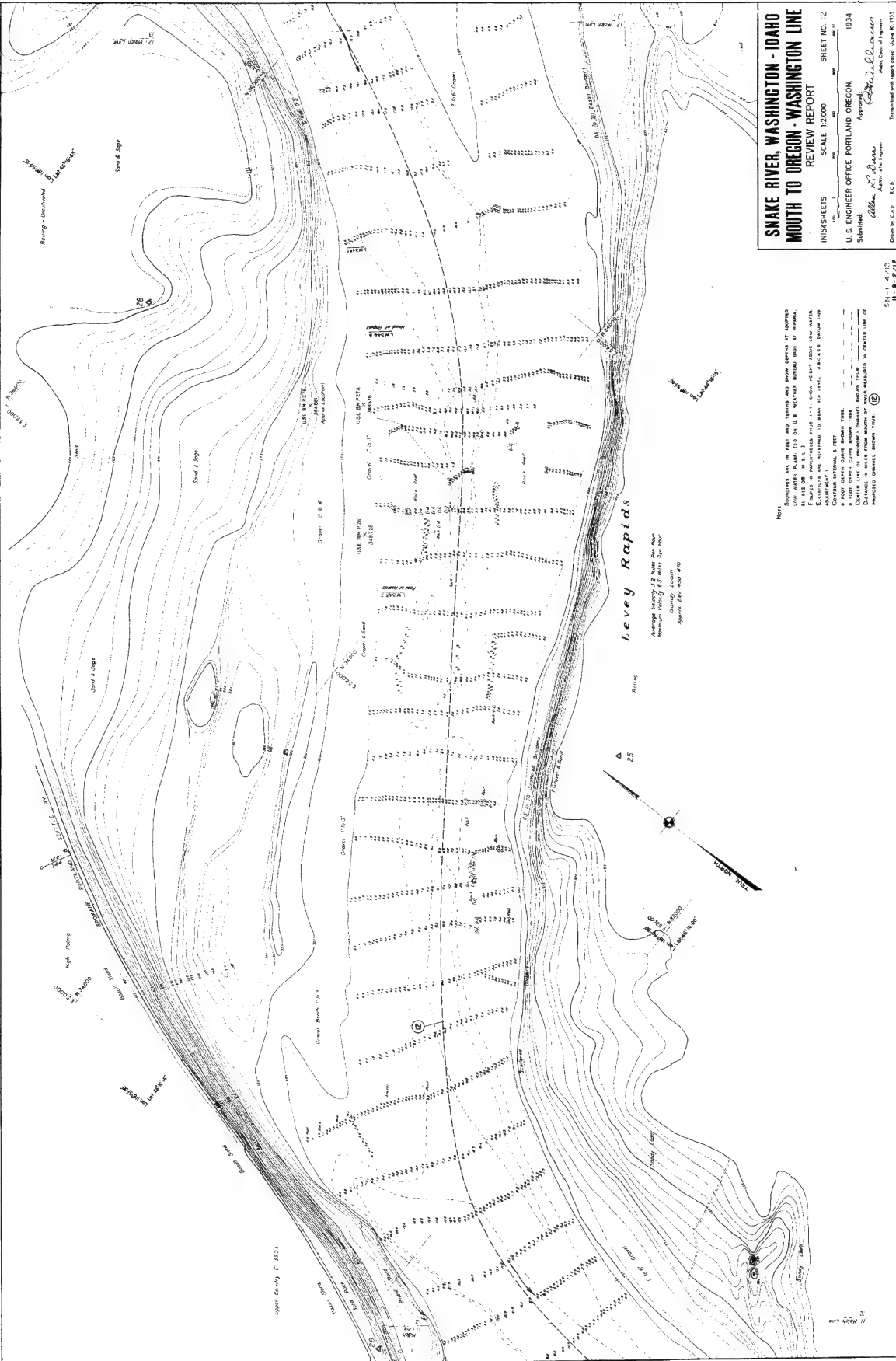
U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934

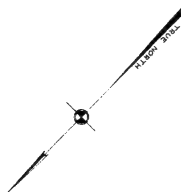
Submitted: _____ Approved: _____

Associate Engineer
Major, Corps of Engineers
Transferred with reserve duty June 30 1955
JMA

SELECT THE POINT CATEGORIES UNDER DISCUSSION:

SN-1211



[illegible]

**SNAKE RIVER, WASHINGTON - IDAHO
MOUTH TO OREGON - WASHINGTON LINE
REVIEW REPORT**

IN154SHEETS SCALE 12.000 SHEET NO. 13

Year	Number of Cases (approx.)
1980	400,000
1981	420,000
1982	440,000
1983	460,000
1984	480,000
1985	500,000
1986	520,000
1987	540,000
1988	560,000
1989	580,000
1990	600,000

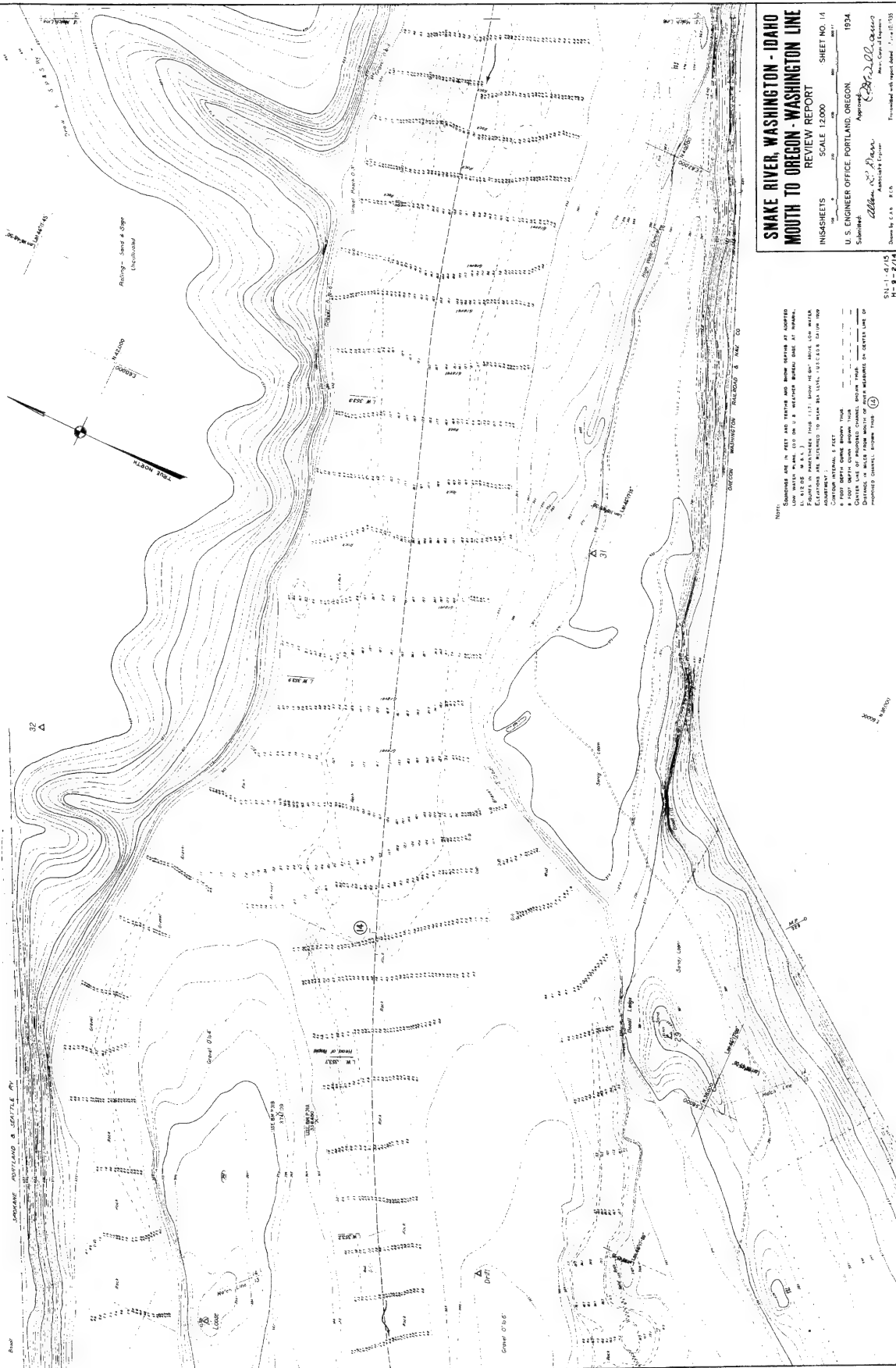
U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934

Submitted: 17 May 2009
Approved: C. H. D. O. O.

Associate Engineer
Major, Corps of Engineers

Drawn by C A D , JMB

SN-1-213



**SNAKE RIVER, WASHINGTON - IDAHO
MOUTH TO OREGON - WASHINGTON LINE**
REVIEW REPORT

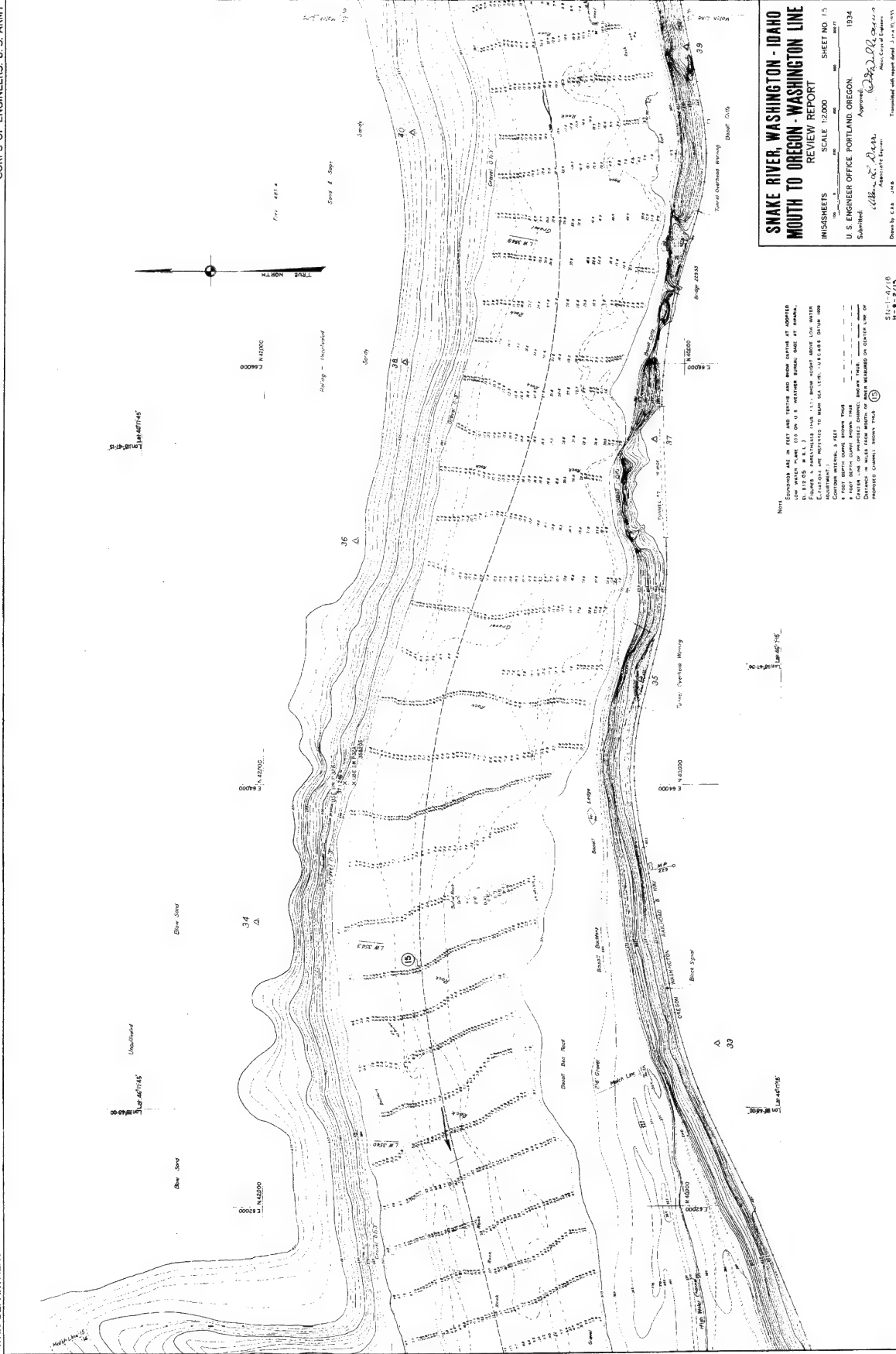
UNIS4SHEETS SCALE 12,000 SHEET NO. 14
U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934.

Submitted: *Allen L. Pann*
Associate Engineer

Approved: *C. H. Williams*
Major, Corps of Engineers

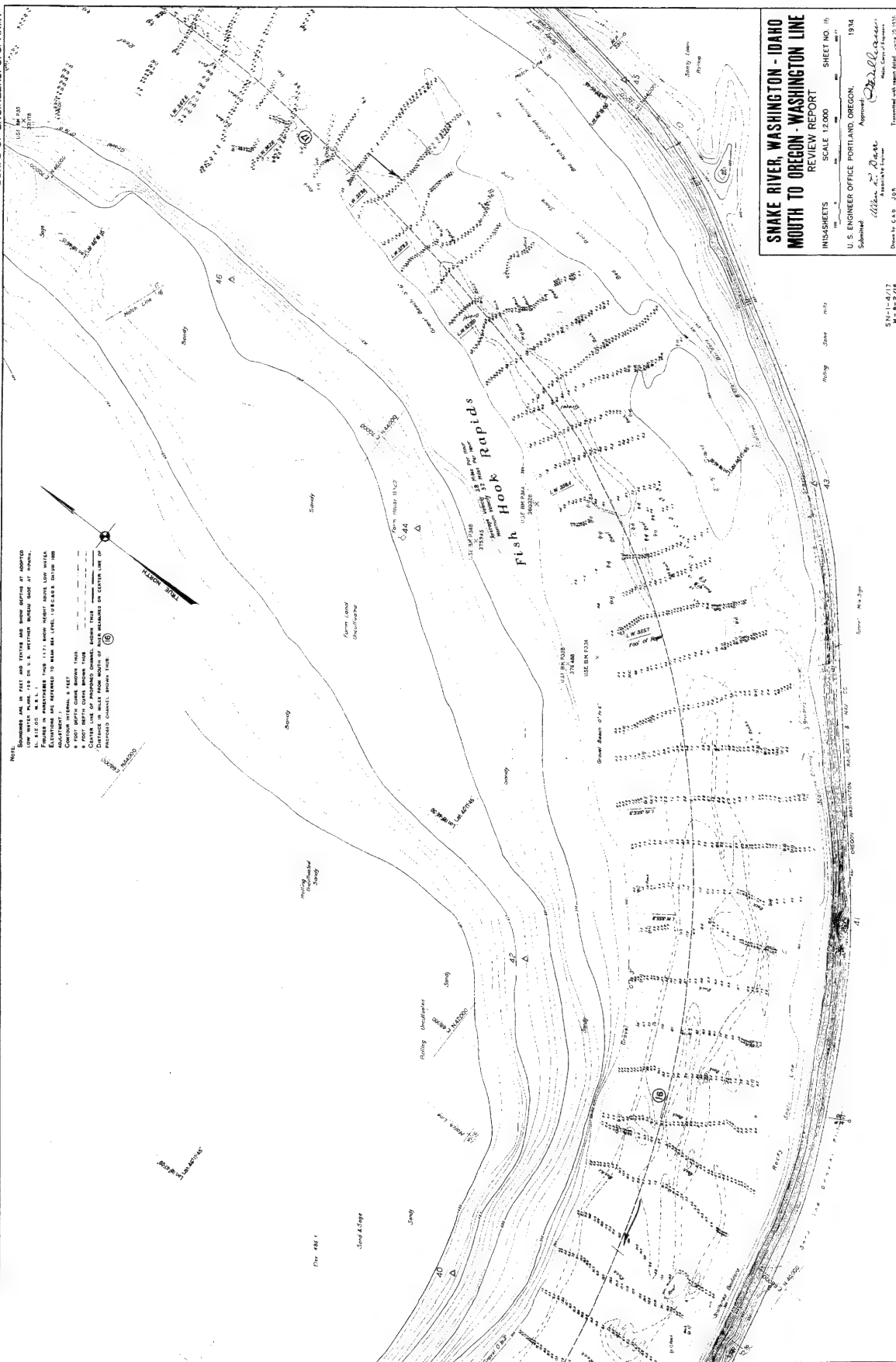
Transmitted with original dated 10-10-1945

SN-1-12/14



Notes:
 ELEVATIONS ARE IN FEET AND TYPICAL AND MEAN SURFACE AT CORRECTED LOW WATER PLANE (10 ON 11) MEASURED FROM BASE OF MEAN SEA LEVEL. ELEVATIONS ARE MEASURED TO MEAN SEA LEVEL, UNLESS OTHERWISE NOTED.
 ELEVATIONS ARE MEASURED TO MEAN SEA LEVEL, UNLESS OTHERWISE NOTED.
 Contour interval, 5 feet.
 * FOOT SURVEY DATA FROM 1910 TO 1915.
 * SURVEY DATA FROM 1916 TO 1918.
 * SURVEY DATA FROM 1919 TO 1921.
 * SURVEY DATA FROM 1922 TO 1924.
 * SURVEY DATA FROM 1925 TO 1927.
 * SURVEY DATA FROM 1928 TO 1930.
 * SURVEY DATA FROM 1931 TO 1933.
 * SURVEY DATA FROM 1934 TO 1936.
 * SURVEY DATA FROM 1937 TO 1939.
 * SURVEY DATA FROM 1940 TO 1942.
 * SURVEY DATA FROM 1943 TO 1945.
 * SURVEY DATA FROM 1946 TO 1948.
 * SURVEY DATA FROM 1949 TO 1951.
 * SURVEY DATA FROM 1952 TO 1954.
 * SURVEY DATA FROM 1955 TO 1957.
 * SURVEY DATA FROM 1958 TO 1960.
 * SURVEY DATA FROM 1961 TO 1963.
 * SURVEY DATA FROM 1964 TO 1966.
 * SURVEY DATA FROM 1967 TO 1969.
 * SURVEY DATA FROM 1970 TO 1972.
 * SURVEY DATA FROM 1973 TO 1975.
 * SURVEY DATA FROM 1976 TO 1978.
 * SURVEY DATA FROM 1979 TO 1981.
 * SURVEY DATA FROM 1982 TO 1984.
 * SURVEY DATA FROM 1985 TO 1987.
 * SURVEY DATA FROM 1988 TO 1990.
 * SURVEY DATA FROM 1991 TO 1993.
 * SURVEY DATA FROM 1994 TO 1996.
 * SURVEY DATA FROM 1997 TO 1999.
 * SURVEY DATA FROM 2000 TO 2002.
 * SURVEY DATA FROM 2003 TO 2005.
 * SURVEY DATA FROM 2006 TO 2008.
 * SURVEY DATA FROM 2009 TO 2011.
 * SURVEY DATA FROM 2012 TO 2014.
 * SURVEY DATA FROM 2015 TO 2017.
 * SURVEY DATA FROM 2018 TO 2020.

Snake River, Washington - Idaho
Mouth to Oregon - Washington Line
REVIEW REPORT
 INSISHEETS SCALE 1:2,000 SHEET NO. 15
 U. S. ENGINEER OFFICE PORTLAND, OREGON.
 Submitted: *[Signature]*
 Approved: *[Signature]*
 Date: *[Date]*
 Transmitted with report dated 1-15-1915
 SN-1-12/15



**SNAKE RIVER, WASHINGTON - IDAHO
MOUTH TO OREGON - WASHINGTON LINE
REVIEW REPORT**

INIS4SHEETS SCALE 1:2,000 SHEET NO. 16

IN 24 SHEETS
SCALE 12,000
SHEET NO. 10

U. S. ENGINEER OFFICE PORTLAND, OREGON. 1934

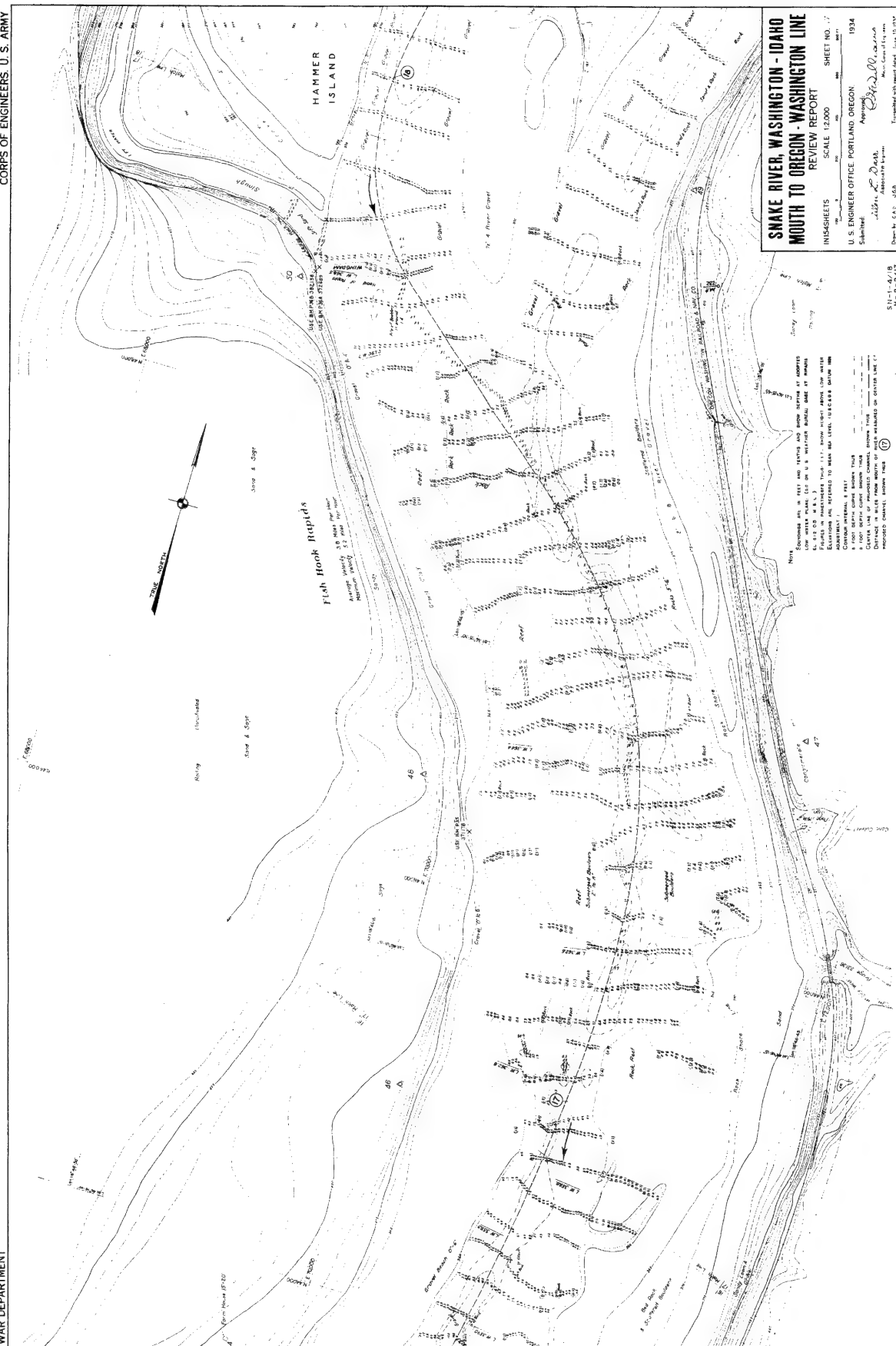
Submitted: _____ Approved: _____
C. C. ENGINEER OFFICE PORTLAND, OREGON. 1334

Wm. L. Barr

Associate Engineer
Major, Corps of Engineers

Drawn by C A D JON
Transmitted with report dated June 10 1955.

91/21-1-NS
SN-1-12/16



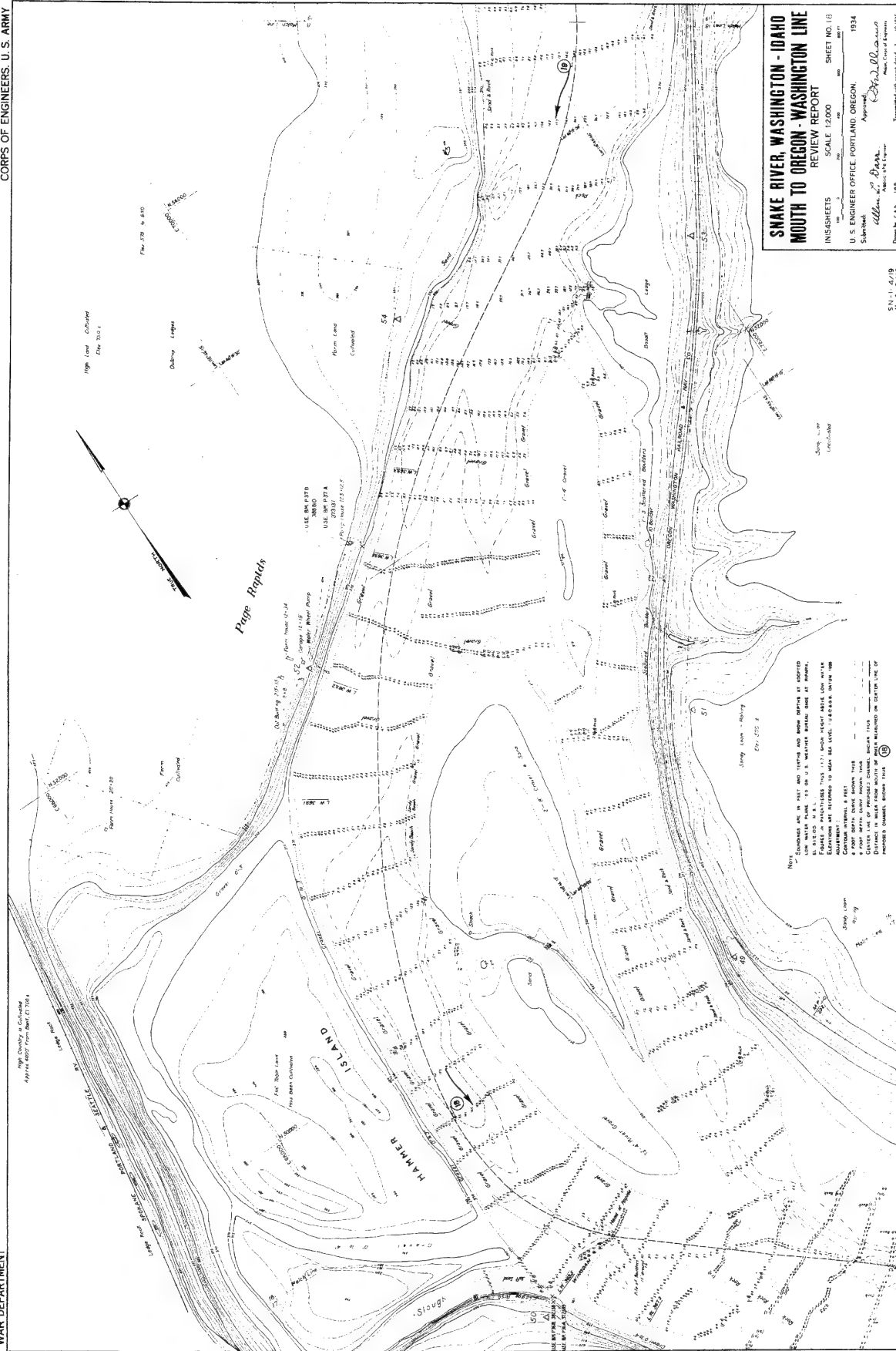
**SNAKE RIVER, WASHINGTON - IDAHO
MOUTH TO OREGON - WASHINGTON LINE**

INIS4SHEETS SCALE 1:2,000 SHEET NO. 17

U. S. ENGINEER OFFICE. PORTLAND, OREGON. 1934

Wilson L. Darr
Associate Lecturer

Down by CAC JLB



SNAKE RIVER, WASHINGTON - IDAHO
 MOUTH TO OREGON - WASHINGTON LINE

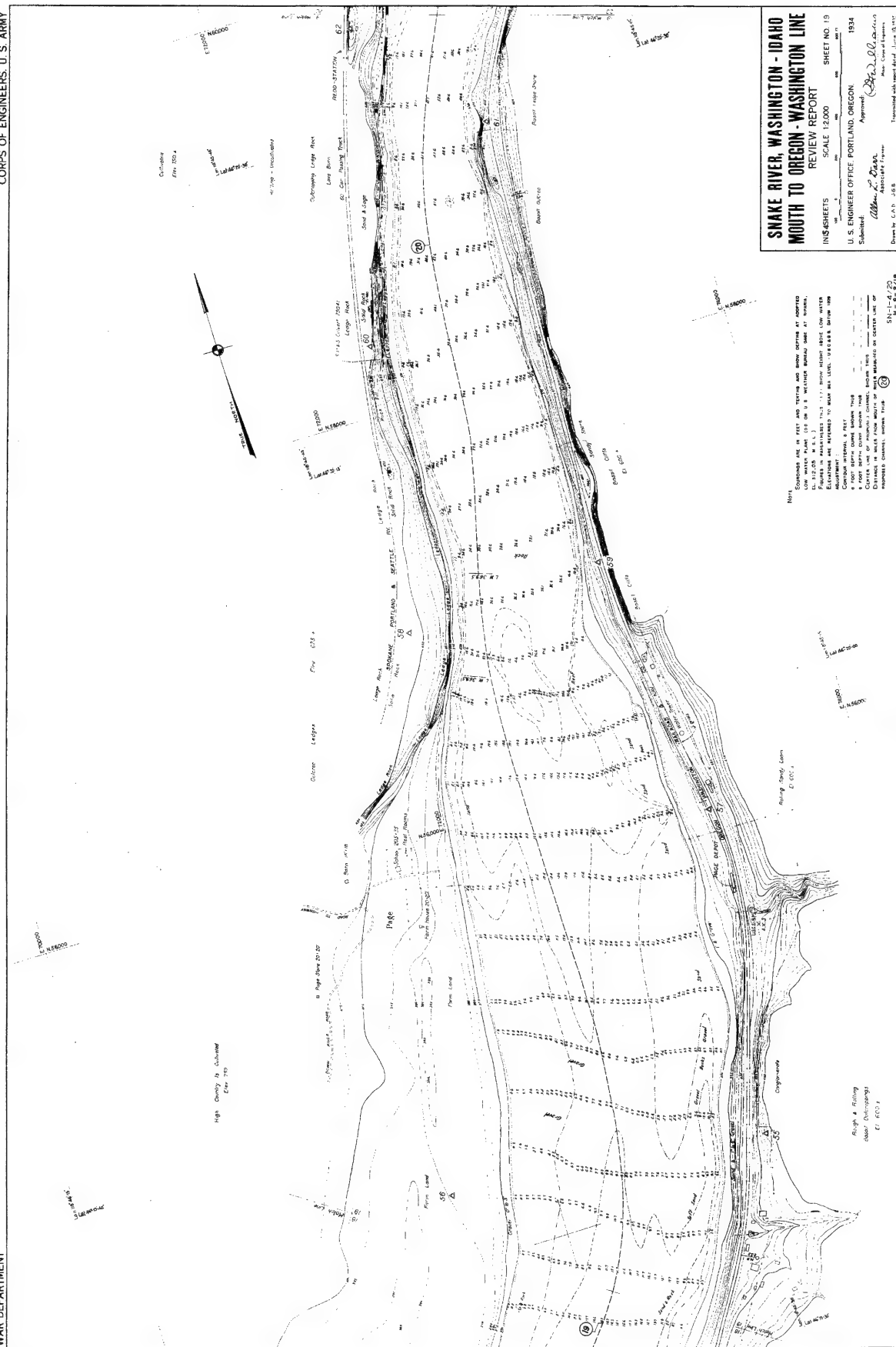
IN154SHEETS SCALE 1:2,000 SHEET NO. 18

Submitted: _____
 Approved: _____
 U. S. ENGINEER OFFICE, PORTLAND, OREGON.
 1934

Allen, L. Barn.
ABOVE: 6'6" Engineer

Dispos by C A D JND Transmitted with report dated June 30 1947
SN-1-12/18

Original by: L A D JND
 Transmitted with report 00448 June 10/1972
 SN-1-12/18



**SNAKE RIVER, WASHINGTON - IDAHO
MOUTH TO OREGON - WASHINGTON LINE**

IN \$4 SHEETS

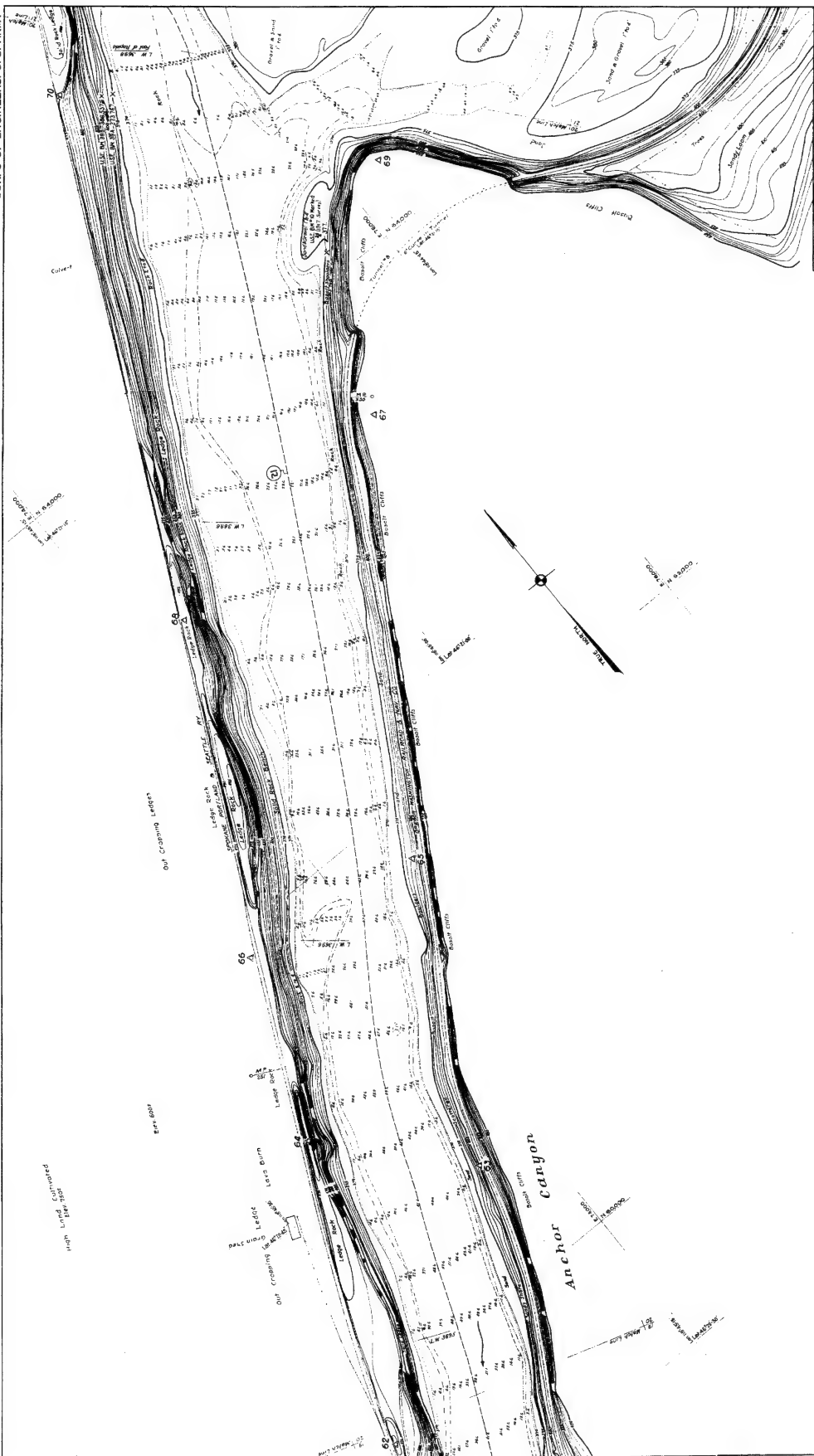
100 0 100 200 300 400 500 600 700

U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934

Submitted: *CM. 28-2*
Approved: *(282) 00.2*

William K. Davis
Associate Engineer
Also: Corps of Engineers
Transmitted with recent dated letter 10 days
From the SAC 4/5/58

SN-1-12/19



Snake River, Washington - Idaho
Mouth to Oregon - Washington Line
REVIEW REPORT

INSIDE SHEETS SCALE 1:2000 SHEET NO 20

U. S. ENGINEER OFFICE PORTLAND, OREGON 1934

Submitted by: *[Signature]*
 Checked by: *[Signature]*
 Approved by: *[Signature]*

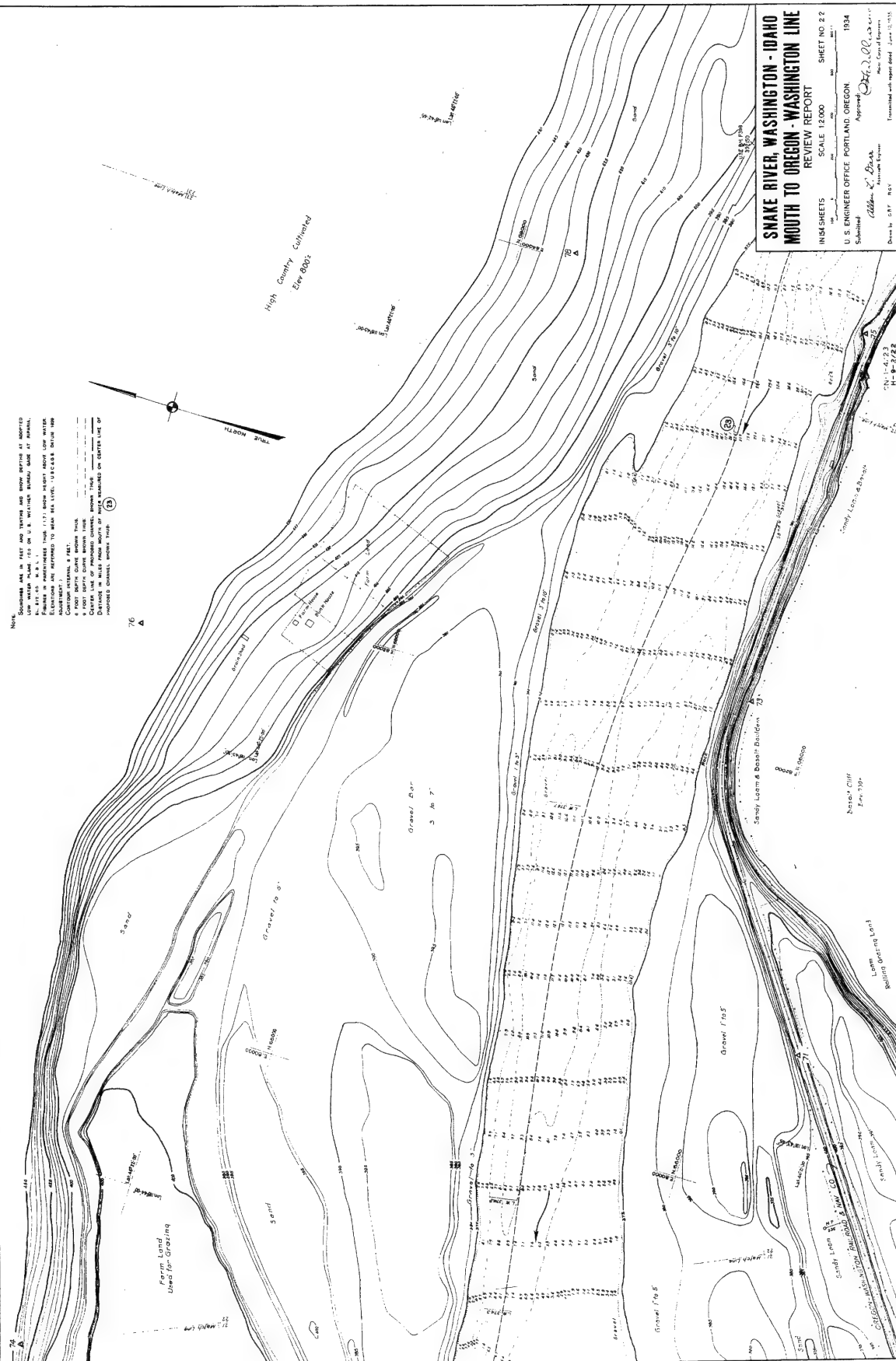
Drawn by: G.B.F. J.C.B.
 Transmitted with report dated June 19, 1934

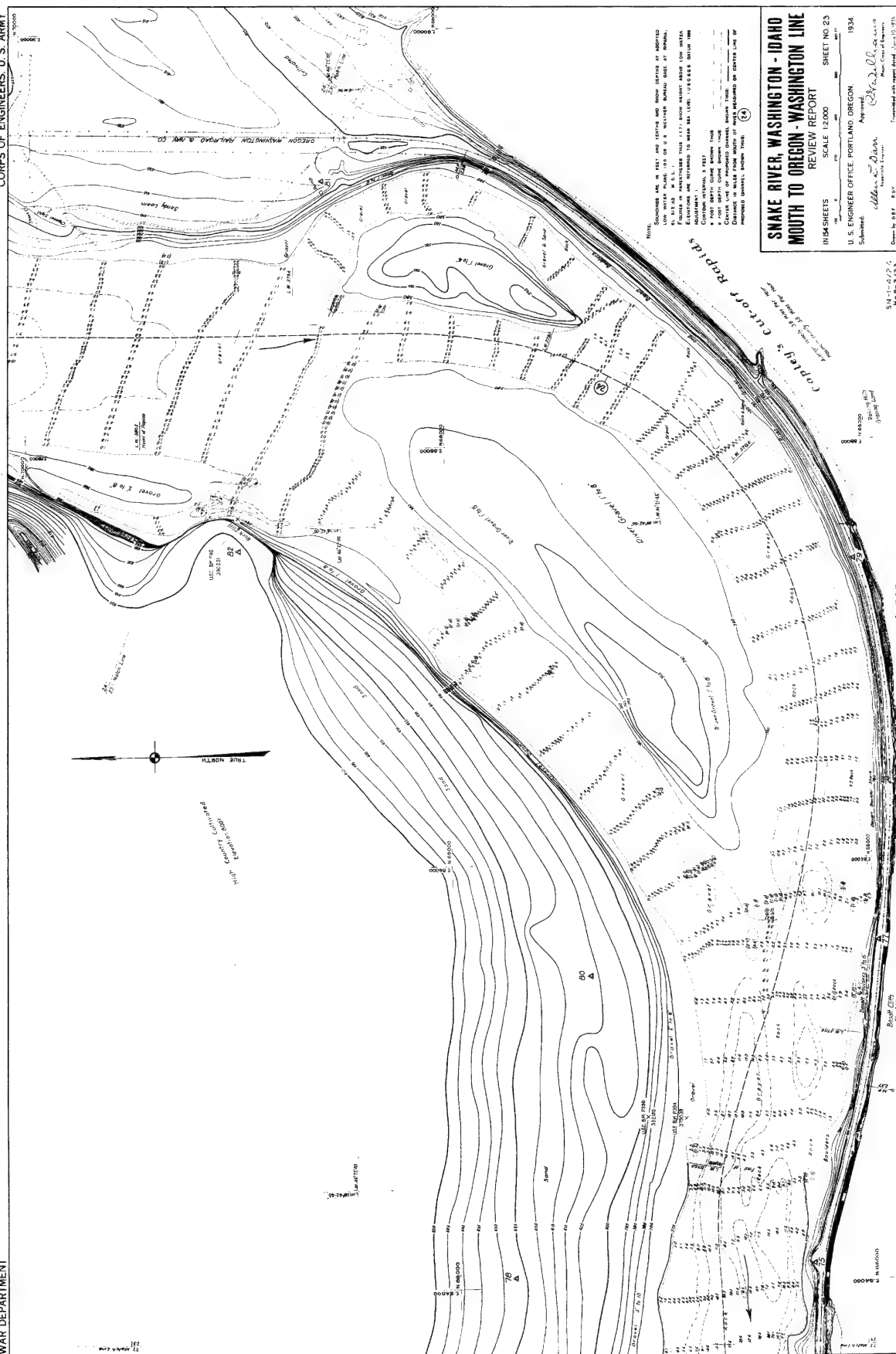
NOTE

ELEVATIONS ARE IN FEET AND TYPICAL AND SHOW SPACING OF ADJUSTED
 ELEVATIONS ARE SHOWN ON THE BASIS OF A 10' VERTICAL SCALE. WHEN AT ADJUSTED
 ELEVATIONS IN PARENTHESES THIS 1:20 SCALE SHOULD BE USED FOR WATER
 ADJUSTMENT. DISTANCES ARE SHOWN IN FEET AND FEET AND INCHES FOR
 ADJUSTMENT.

CONTOUR INTERVALS ARE 10 FEET
 5 FOOT SPACING SHOWN FROM
 5 FOOT SPACING DOWN TO
 10 FOOT SPACING. DISTANCES
 DISTANCE IN FEET FROM MOUTH OF RIVER ESTIMATED ON CENTER LINE OF
 PROPOSED CHANNEL. BENCH MARK (B)







REVIEW REPORT
SNAKE RIVER, WASHINGTON - IDAHO
MOUTH TO OREGON - WASHINGTON LINE

REVIEW REPORT

154 SHEETS SCALE 1:2000 SHEET NO 23

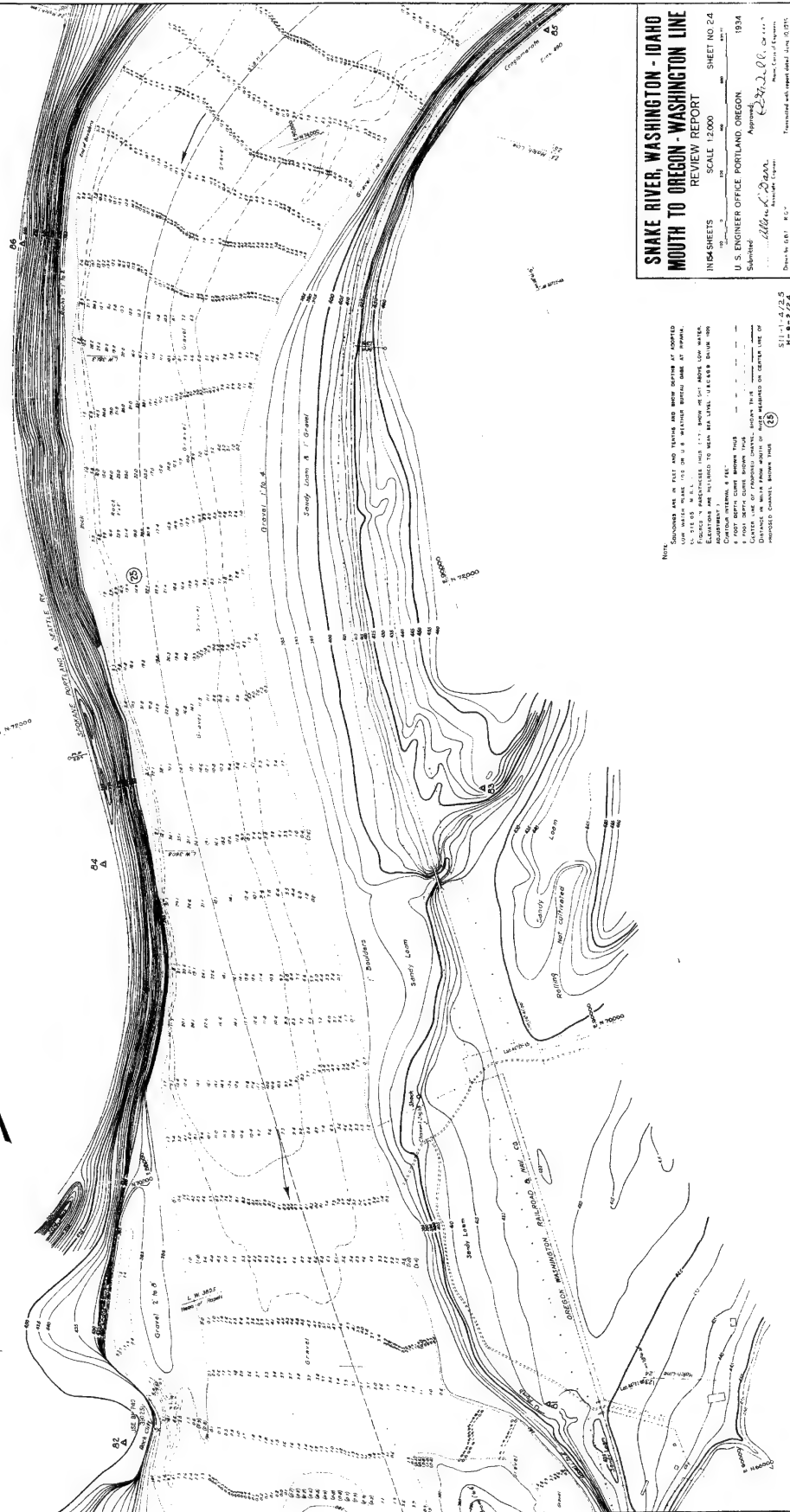
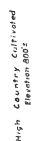
100 0 200 400 600 FT

U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934.

Submitted: *William W. Darr*
Associate Engineer
Approved: *W. H. Zellars*
Major, Corps of Engineers
Checked by GEP RBY
Transmitted with report dated June 10, 1975.
1934.

6N-1-Δ12%

SN-1-12/23



**SNAKE RIVER, WASHINGTON - IDAHO
MOUTH TO OREGON - WASHINGTON LINE**
REVIEW REPORT

15 SHEETS SCALE 1:2,000 SHEET NO. 24

U. S. ENGINEER OFFICE, PORTLAND, OREGON.

1934

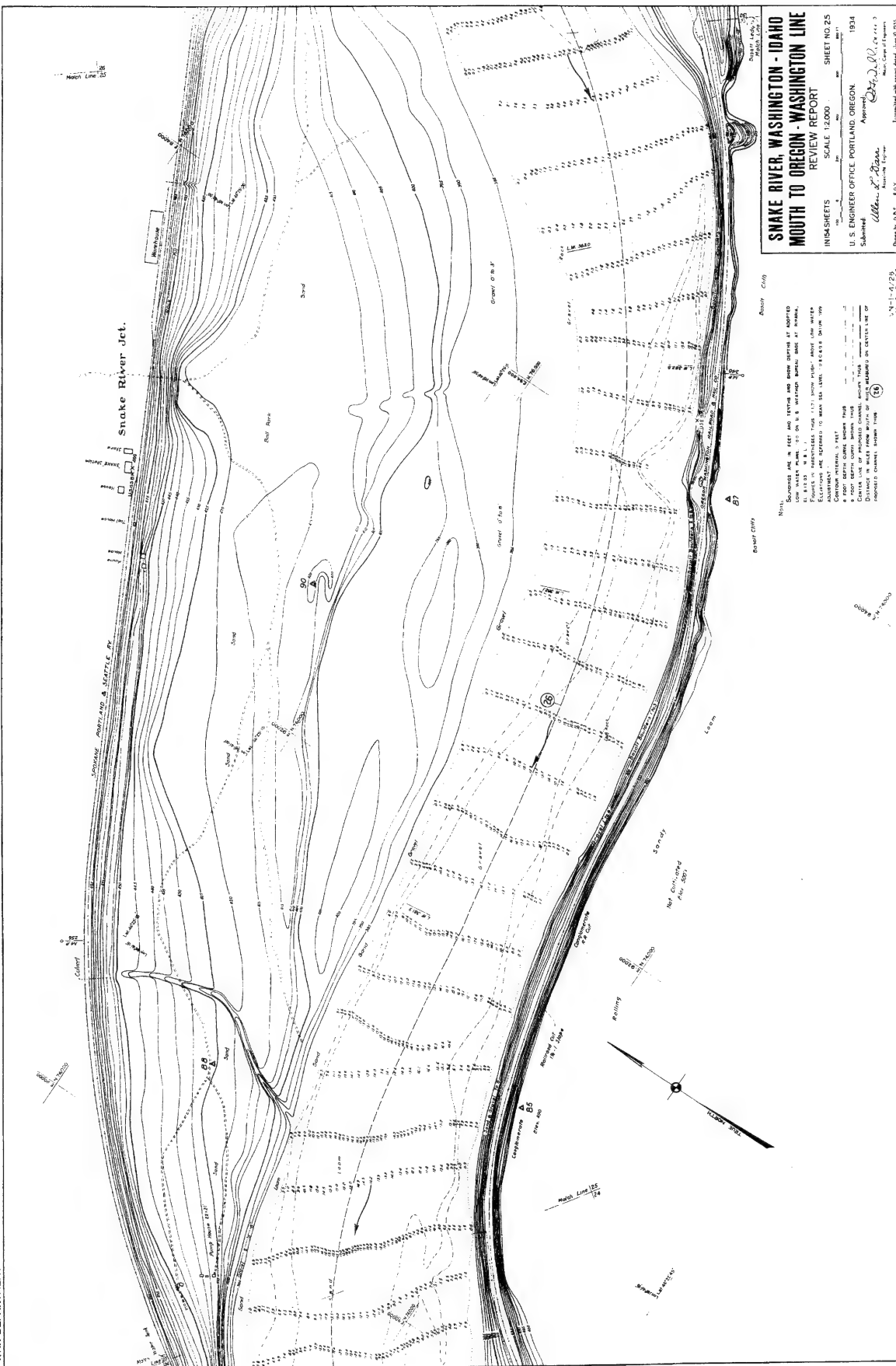
Submitted: _____ Approved: _____

Discussed by GIBBY MCV
Associate Engineer
Transmitted with report dated June 10, 1946
Engine, Corps of Engineers

SN-I-12/24

SPONGES ARE IN EAST TENDING AND BOW DEPTHS AT ADJUSTED
WATER LEVELS. ON 10 METER BUREAU GAGE AT NAPAHA,
ON 214.05 M.S.L.
FIGURES IN PARENTHESES INDICATE SHOWING ABOVE LOW WATER.
ELEVATIONS ARE RELATED TO MEAN SEA LEVEL - 10.6389 DALLIN 1990
ADJUSTMENT.
CORRELATION INTERVAL: 6 HOURS
8 HOUR DEPTH CORRELATION TIME
CENTER LINE OF PARALLEL CHANNEL INDICATED
DISTANCE IN MILES FROM MOUTH OF RIVER MEASURED ON CENTER LINE OF
PARALLEL CHANNEL SHOWN THIS

SIU-1-4/25
K-9-2/24



**SNAKE RIVER, WASHINGTON - IDAHO
MOUTH TO OREGON - WASHINGTON LINE**

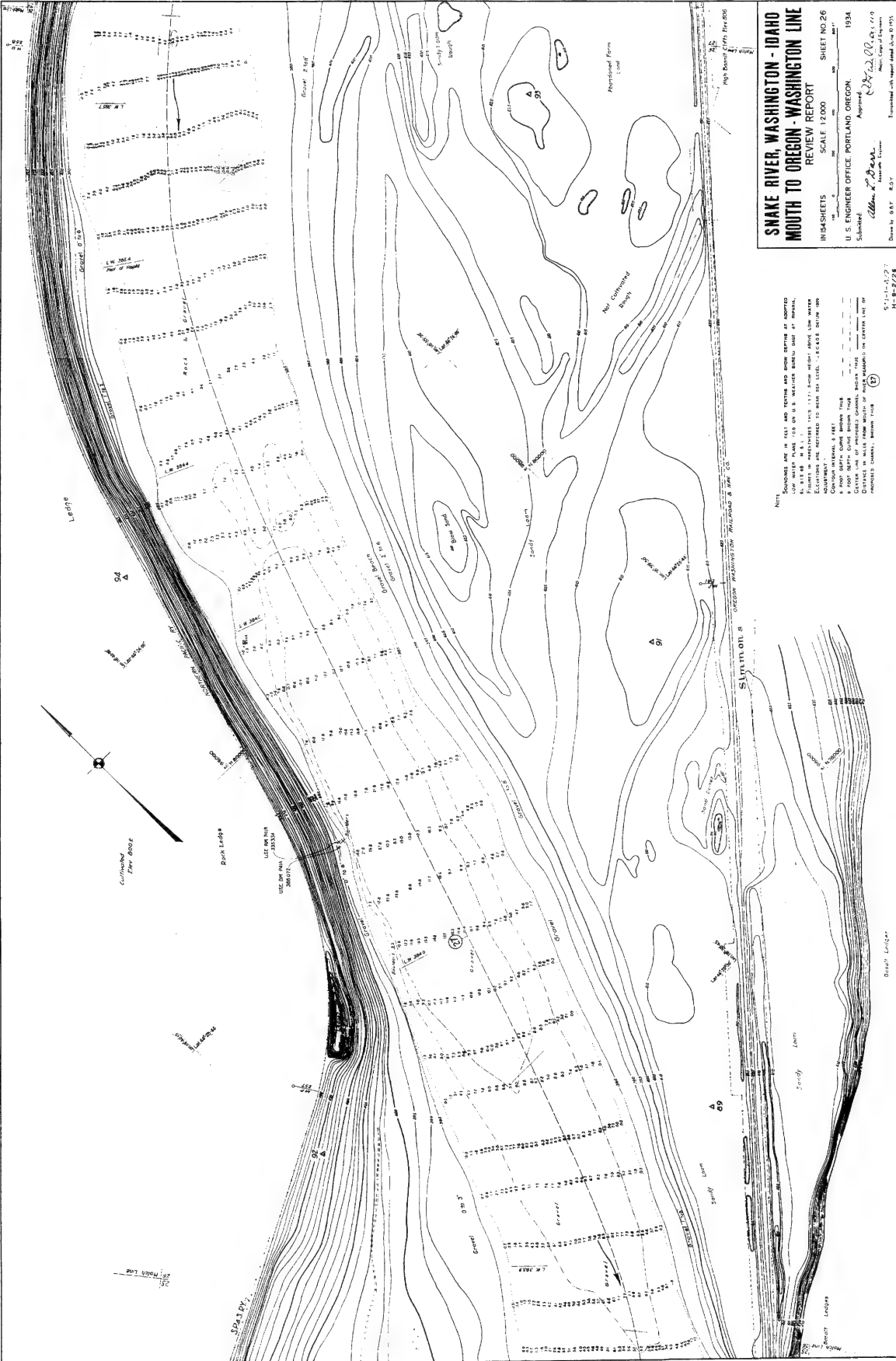
REVIEW REPORT

U.S. S-4 SHEETS SCALE 1:2000 SHEET NO. 25
JUN. 5, ENGINEER OFFICE, PORTLAND, OREGON 1934
Submitted

Walter L. Davis
Assistant Engineer

Approved: [Signature] J. V. ...
Major, Corps of Engineers

Examined with report dated June 6, 1935
SN-11-12725
Drawn by D. F. ROY



Snake River, Washington - Idaho
Mouth to Oregon - Washington Line
REVIEW REPORT
 IN 54 SHEETS SCALE 12,000 SHEET NO. 26
 U. S. ENGINEER OFFICE, PORTLAND, OREGON, 1934
 Submitted: *W. L. B. B.*
 Approved: *W. L. B. B.*
 Due to: 0.81 R. 3.7
 Transmitted with report dated June 10, 1935.
 S N - 1-12/26

Notes:
 ELEVATIONS ARE IN FEET AND MEASURED FROM MEAN SEA LEVEL AT ADAPTED LOW WATER PLANE. USED ON U. S. READER BUREAU MAP AT MEANS.
 ELEVATIONS IN PARENTHESES ARE 100 FEET ABOVE MEAN LOW WATER.
 ELEVATIONS ARE REFERRED TO MEAN SEA LEVEL. 100 FEET MEAN LOW WATER.
 Contour interval, 5 feet.
 A 100 FEET DEPTH CURVE SHOWS THAT
 CENTER LINE OF PROPOSED CANAL, BEING THAT
 OF THE 100 FEET DEPTH CURVE, IS 100 FEET
 DEEPER THAN THE 100 FEET DEPTH CURVE.
 PROPOSED CHANNEL, BEING THAT
 OF THE 100 FEET DEPTH CURVE, IS 100 FEET
 DEEPER THAN THE 100 FEET DEPTH CURVE.
 S N - 1-12/26
 H - 9-2/26

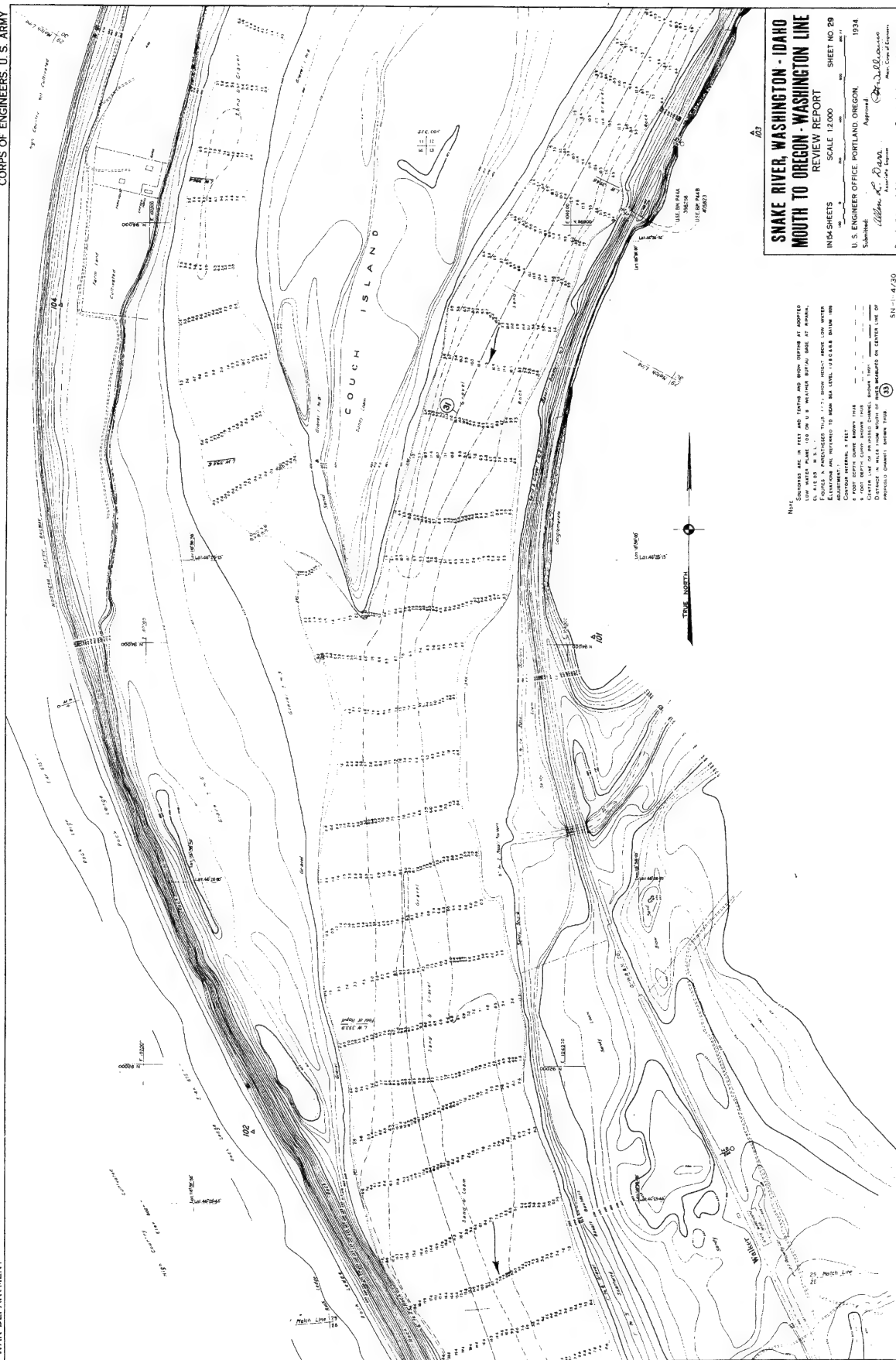


Snake River, Washington - Idaho Mouth to Oregon - Washington Line
REVIEW REPORT
 INSUBSHEETS SCALE 1:2000 SHEET NO 27
 U. S. ENGINEER OFFICE PORTLAND, OREGON
 Submitted: *[Signature]* Approved: *[Signature]*
 1834
 Transmitted with report dated June 1911
 Done by R. C. R. R.

Notes:
 1. Boundaries are in feet and tenths and show details at 1000 feet.
 2. Elevation is in feet and tenths and show details at 1000 feet.
 3. Elevation is in feet and tenths and show details at 1000 feet.
 4. Elevation is in feet and tenths and show details at 1000 feet.
 5. Elevation is in feet and tenths and show details at 1000 feet.
 6. Elevation is in feet and tenths and show details at 1000 feet.
 7. Elevation is in feet and tenths and show details at 1000 feet.
 8. Elevation is in feet and tenths and show details at 1000 feet.
 9. Elevation is in feet and tenths and show details at 1000 feet.
 10. Elevation is in feet and tenths and show details at 1000 feet.



SNAKE RIVER, WASHINGTON - IDAHO
 MOUTH TO OREGON - WASHINGTON LINE
 REVIEW REPORT
 SCALE 1:20,000
 SHEET NO 26
 U. S. ENGINEER OFFICE, PORTLAND, OREGON.
 Approved: *Edw. J. Davis*
 Submitting Engineer: *Allen L. Davis*
 Date: 1/20/28
 Transmitted with report dated March 1928
 SN-1-12/28
 Drawn by R.C.B. R.O.



**Snake River, Washington - Idaho
Mouth to Oregon - Washington Line**
Review Report

IN 154 SHEETS

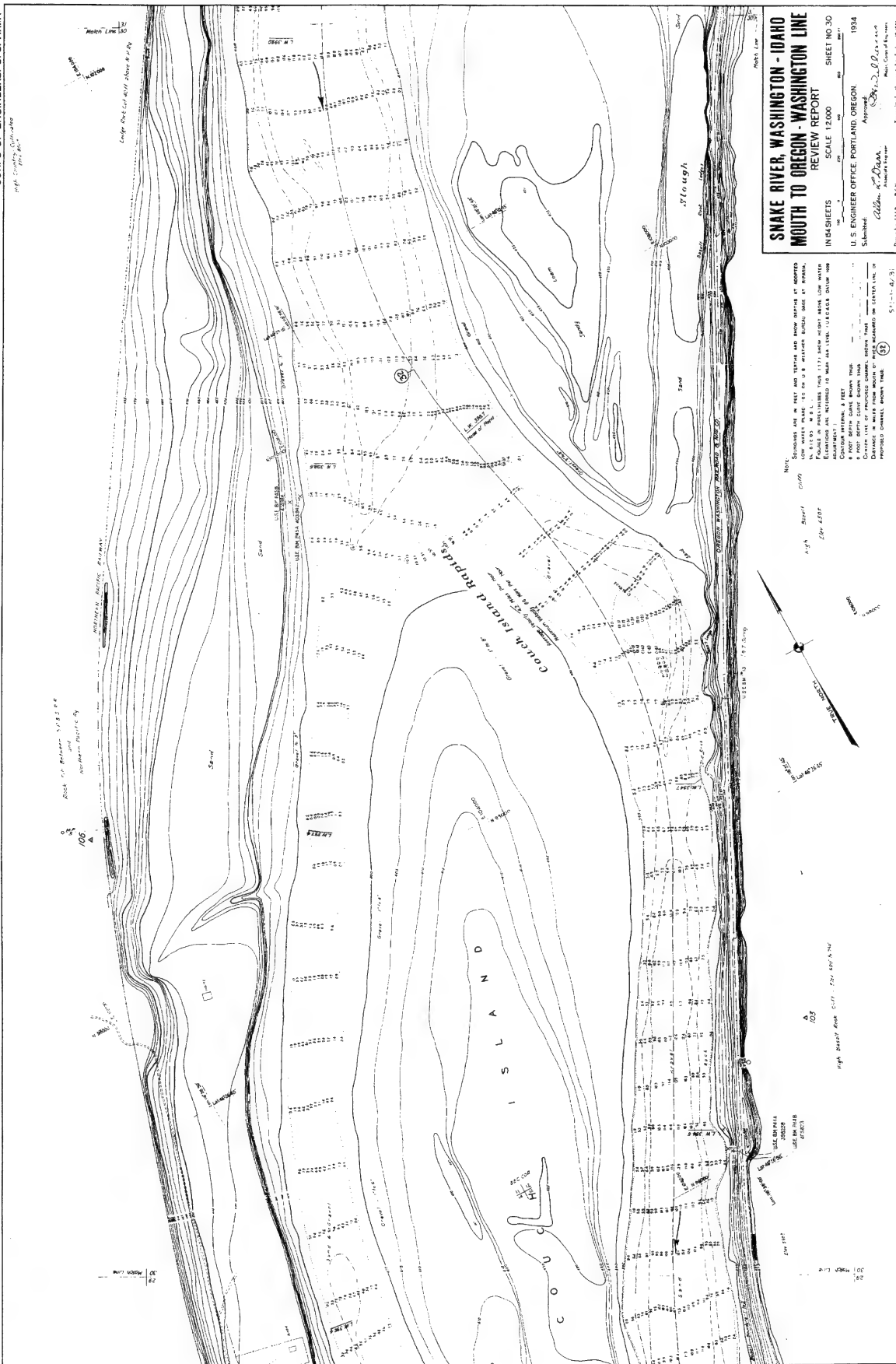
U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934.

Submitted: _____ Approved: _____
U. S. ENGINEER OFFICE, PORTLAND, OREGON, 1934.

Allen L. Davis

Deputy Asst. Dir. of Eng. Div.
Assoc. Asst. Engr.
Major, Corps of Engineers
Transmitted with report dated June 19, 1935

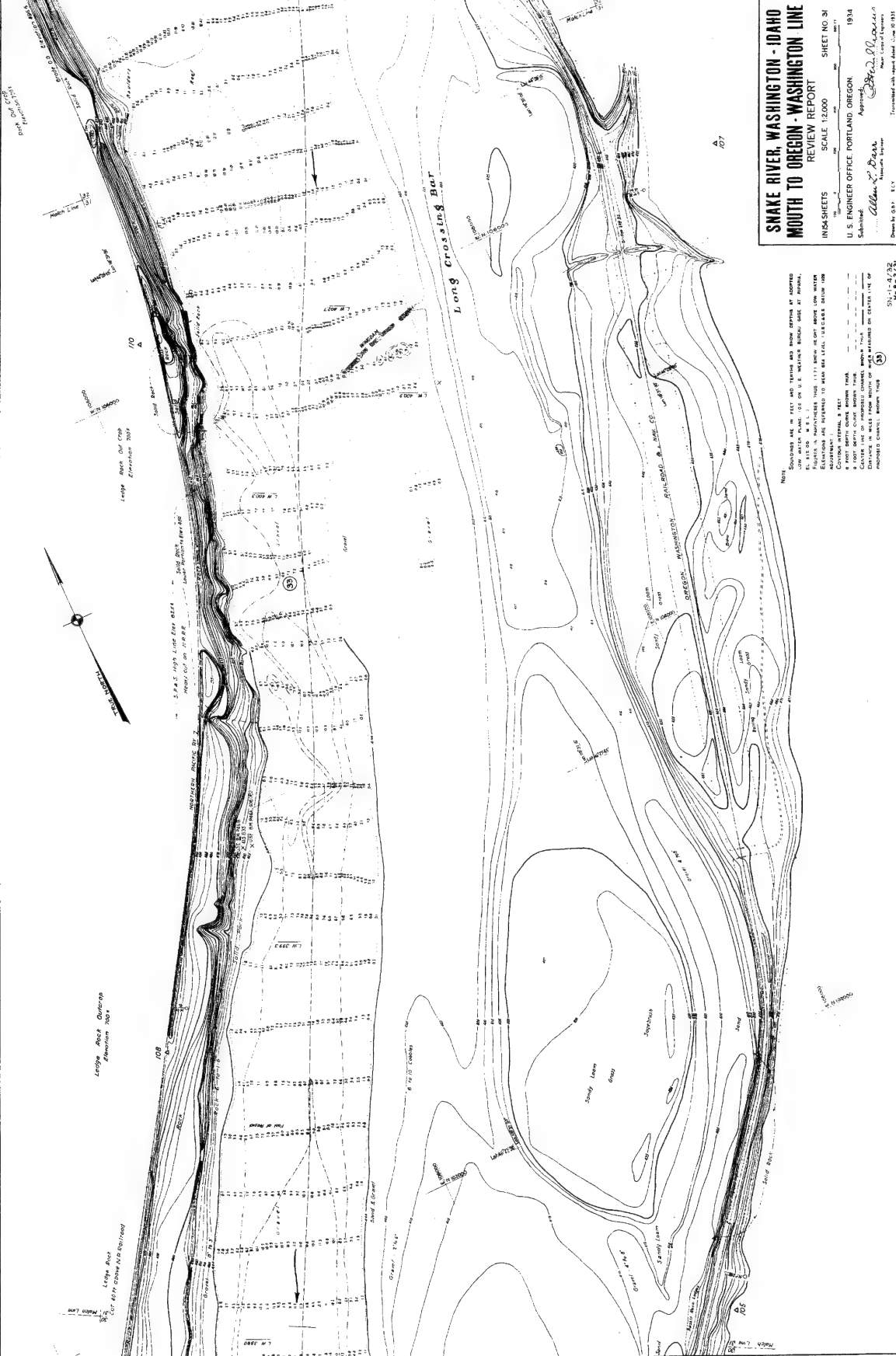
62721-1-NS



SNAKE RIVER, WASHINGTON - IDAHO
 MOUTH TO OREGON - WASHINGTON LINE
 REVIEW REPORT
 SCALE 1:2,000
 SHEET NO. 30
 IN 54 SHEETS

IN 4 SHEETS SCALE 12,000 SHEET NO 30
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U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934
Submitted Approved
William H. Davis Assistant Engineer
W. H. Davis Major, Corps of Eng. Corps

OE / 21-1-N S



Snake River, Washington - Idaho Mouth to Oregon - Washington Line
 REVIEW REPORT
 INKSHEETS SCALE 12,000 SHEET NO. 31
 U. S. ENGINEER OFFICE PORTLAND, OREGON
 Submitted: *Allen S. Davis* Approved: *Allen S. Davis*
 Date: 1934
 Checked by: *Allen S. Davis* E. L. Y.

NOTE
 1. This map was prepared from the original survey data and is not a reproduction of the original map.
 2. The map is a review report and is not a final map.
 3. The map is a review report and is not a final map.
 4. The map is a review report and is not a final map.
 5. The map is a review report and is not a final map.
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 7. The map is a review report and is not a final map.
 8. The map is a review report and is not a final map.
 9. The map is a review report and is not a final map.
 10. The map is a review report and is not a final map.

SN-1-12731

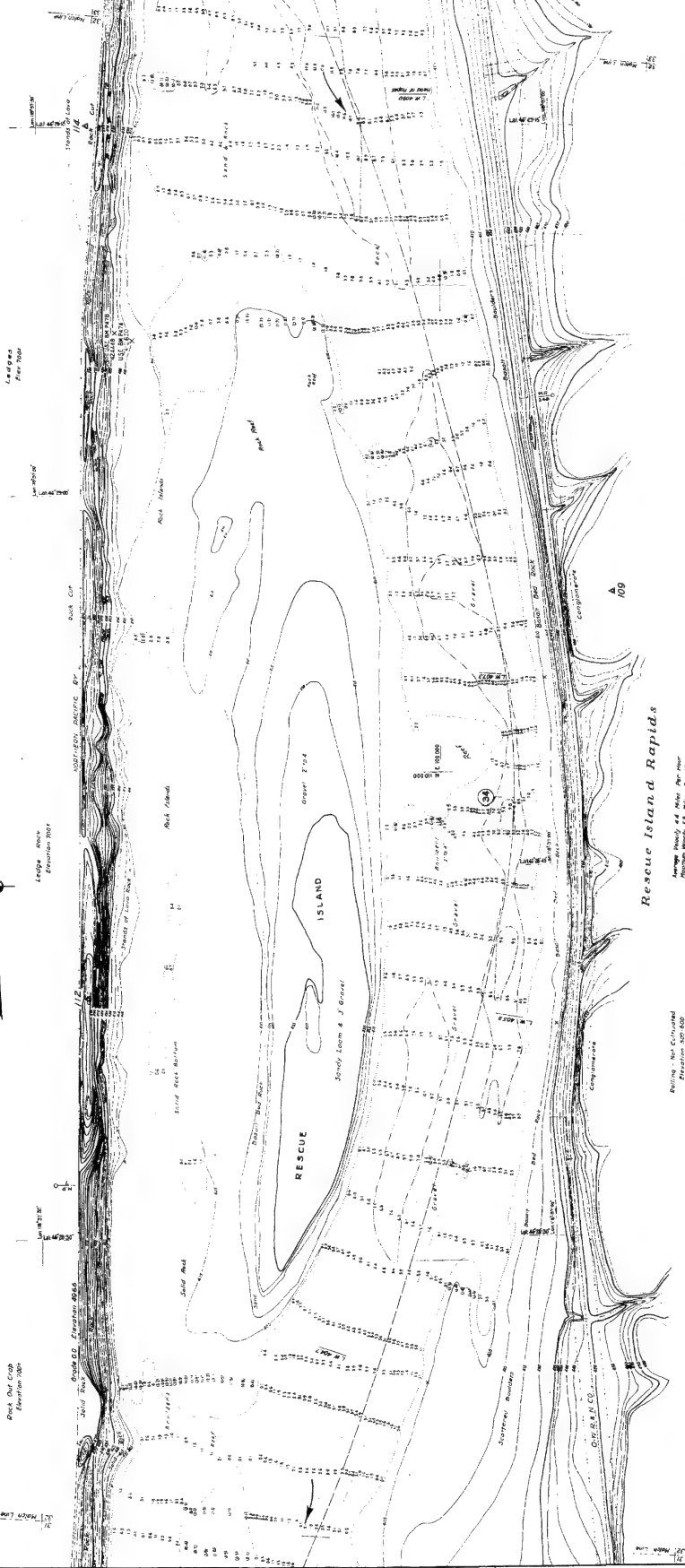
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Elevation 8500

High Country Contoured
Elevation 8500

0 10000

0 10000

0 10000



**Snake River, Washington - Idaho
Mouth to Oregon - Washington Line
Review Report**

INHA SHEETS SCALE 12,000 SHEET NO. 32

U. S. ENGINEERS OFFICE, PORTLAND, OREGON

Submitted *Allen E. Doss* Approved *Allen E. Doss*

1934

Transmitted with report dated June 18, 1934

SN-1-12/32

NOTE:

SOUNDINGS ARE IN FEET AND TENTHS AND SHOW DEPTH AT LOWEST STAGE OF FLOODING.

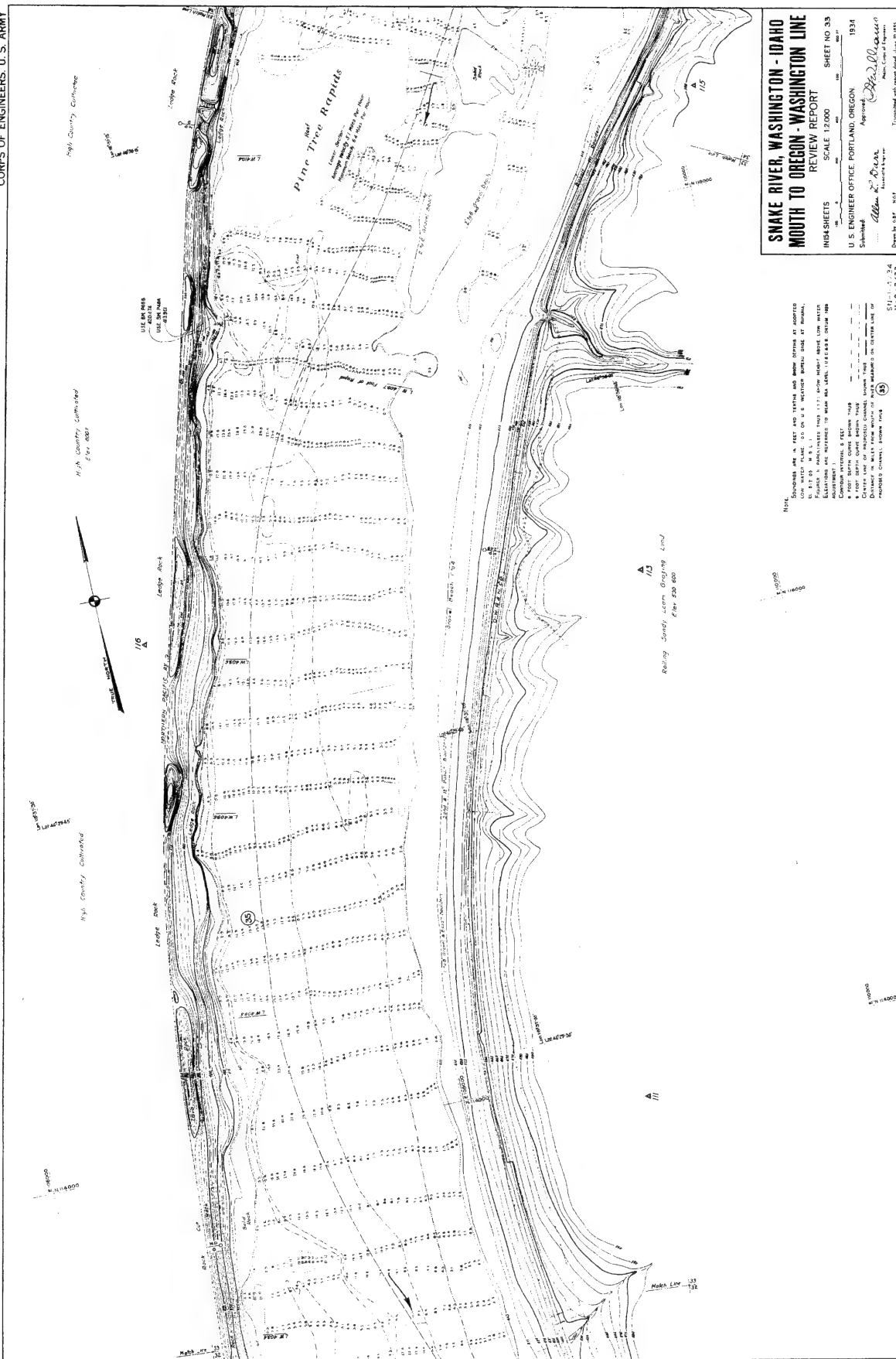
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**Snake River, Washington - Idaho
Mouth to Oregon - Washington Line**

REVIEW REPORT

UNION SHEETS SCALE 1:2000 SHEET NO 33

U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934

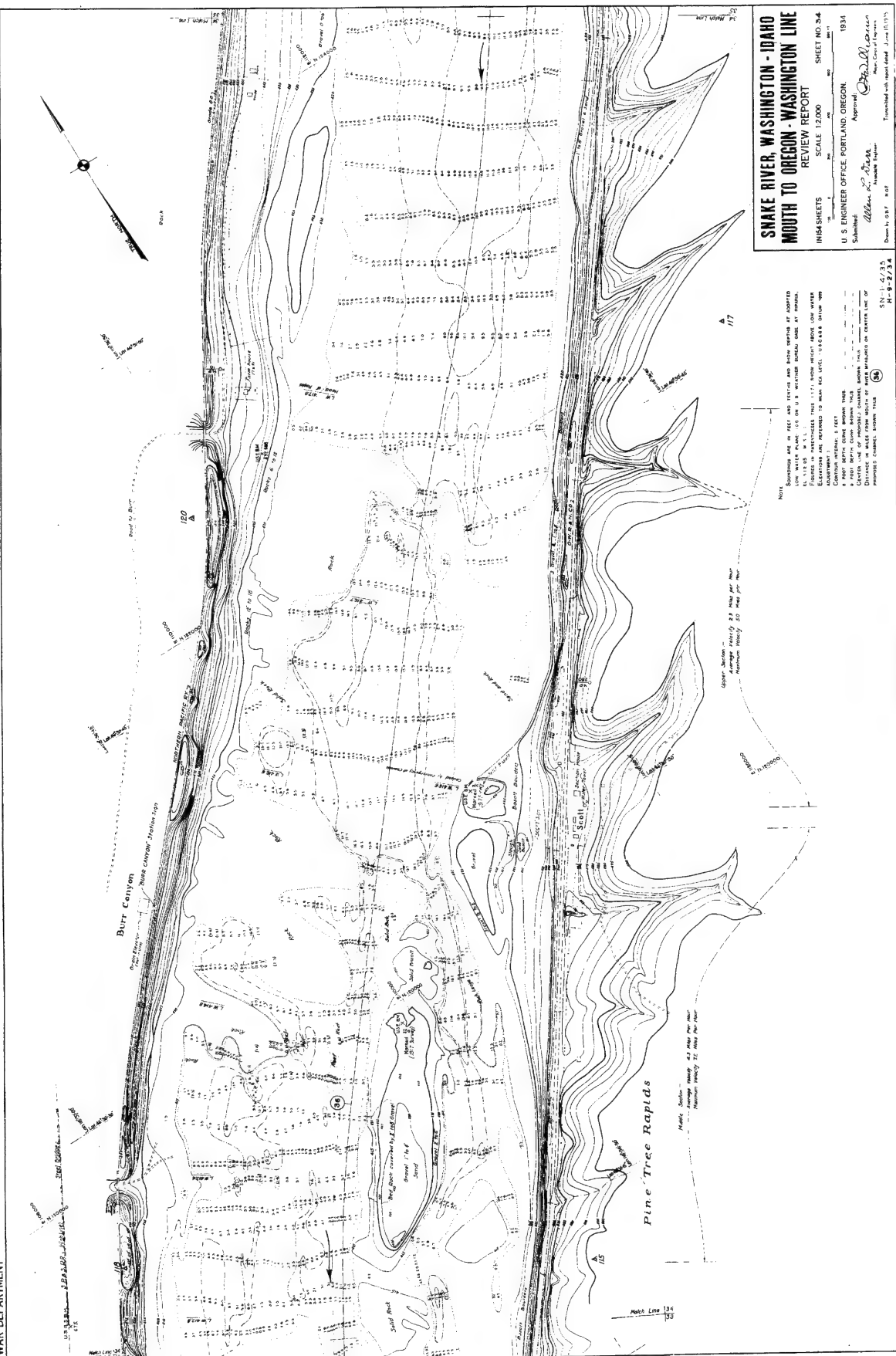
Submitted: 210. 7.3. 2000

Approved: (Signature) 00.00.00.00

Associação Brasileira de Engenharia

Transmitted with report dated June 10, 1935

5N-1-12/33



SNAKE RIVER, WASHINGTON - IDAHO
 MOUTH TO OREGON - WASHINGTON LINE

REVIEW REPORT

MINIS4 SHEETS

SCALE 12,000

SHEET NO. 34

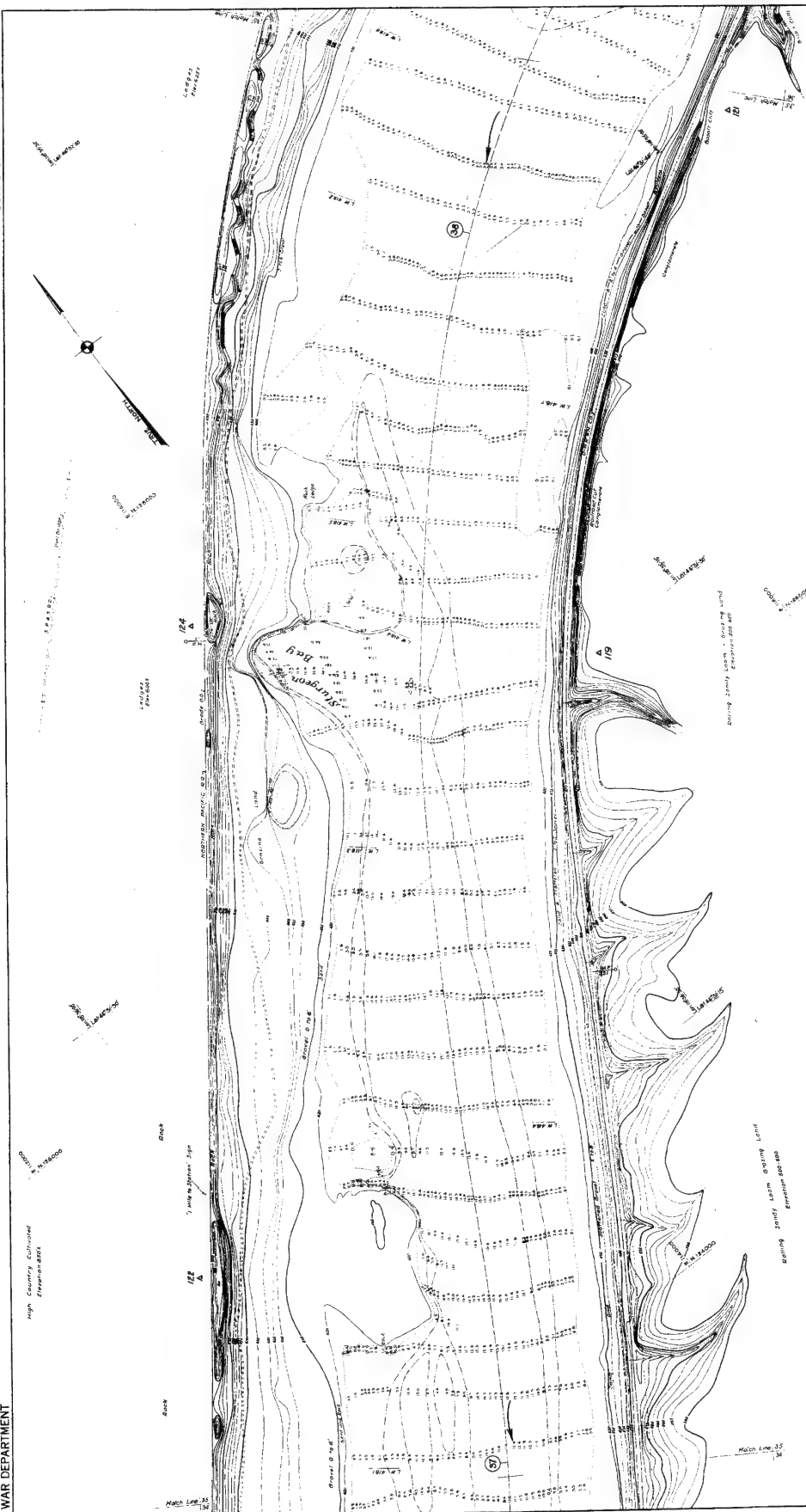
U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934

Submitted: 12/1/20 Approved: [Signature]

Allen L. Darr
Associate Engineer

Dissem by G B F H O F

Transmitted with report dated J.
SN-1-12/34



**SNAKE RIVER, WASHINGTON - IDAHO
MOUTH TO OREGON - WASHINGTON LINE**

REVIEW REPORT

IN 154 SHEETS SCALE 1:2000 SHEET NO 35

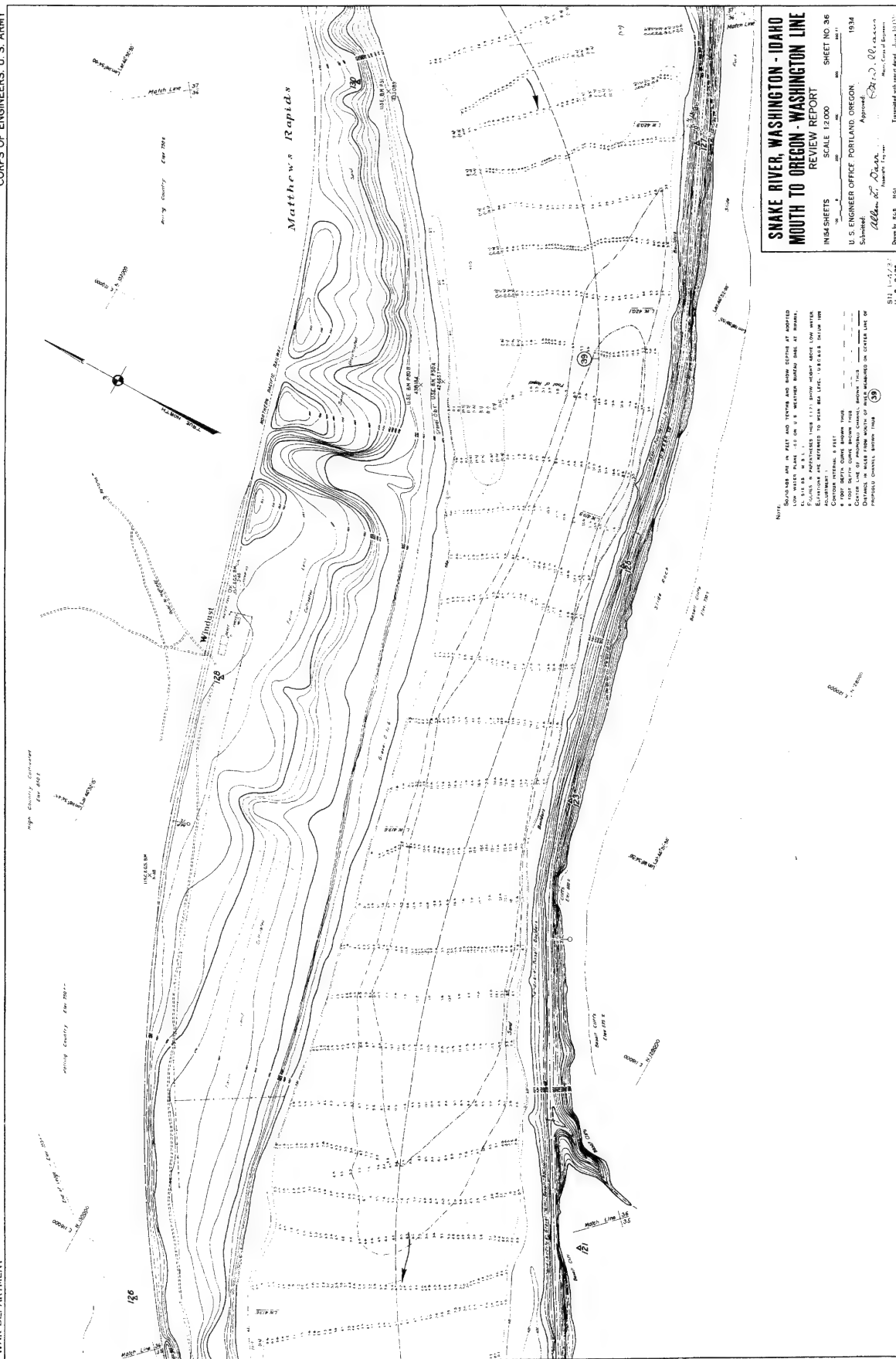
U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934

Submitted: _____ Approved: _____

Allen L. Larr
Associate Engineer

Drawn by 687 HOP

SN-1-12/35



**Snake River, Washington - Idaho
Mouth to Oregon - Washington Line**

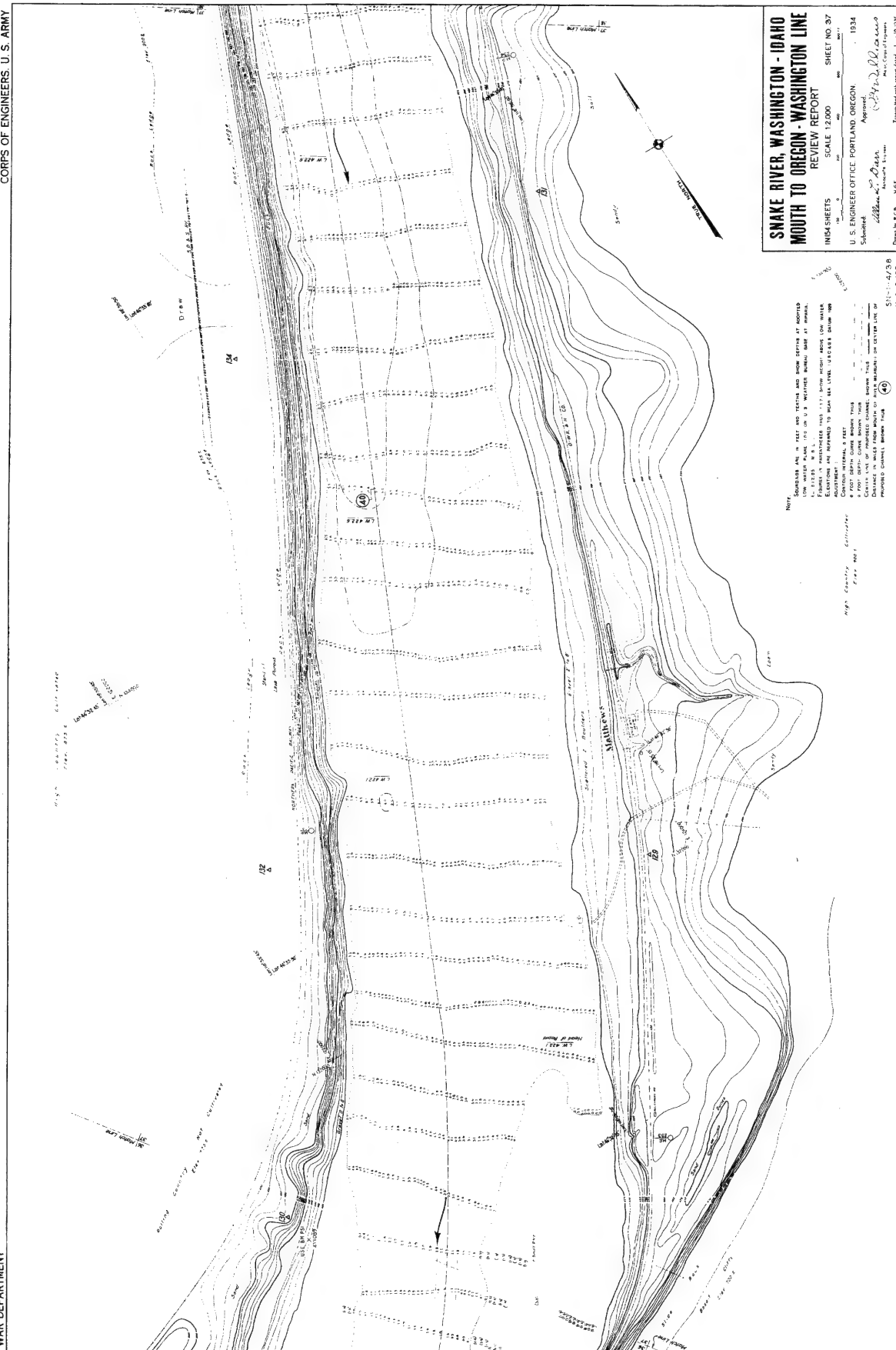
IN 54 SHEETS SCALE 1:2,000 SHEET NO. 36

U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934

Submitted: Allen L. Parr
Approved: Brian D. Larson

Approved: *Frederic*
Dean by R.G.B. H.G.A.
Major, Corps of Engineers
Transmitted with report dated June 10, 1955.

SN-1-12/36



SNAKE RIVER, WASHINGTON - IDAHO
 MOUTH TO OREGON - WASHINGTON LINE

REVIEW REPORT

UNIS4 SHEETS

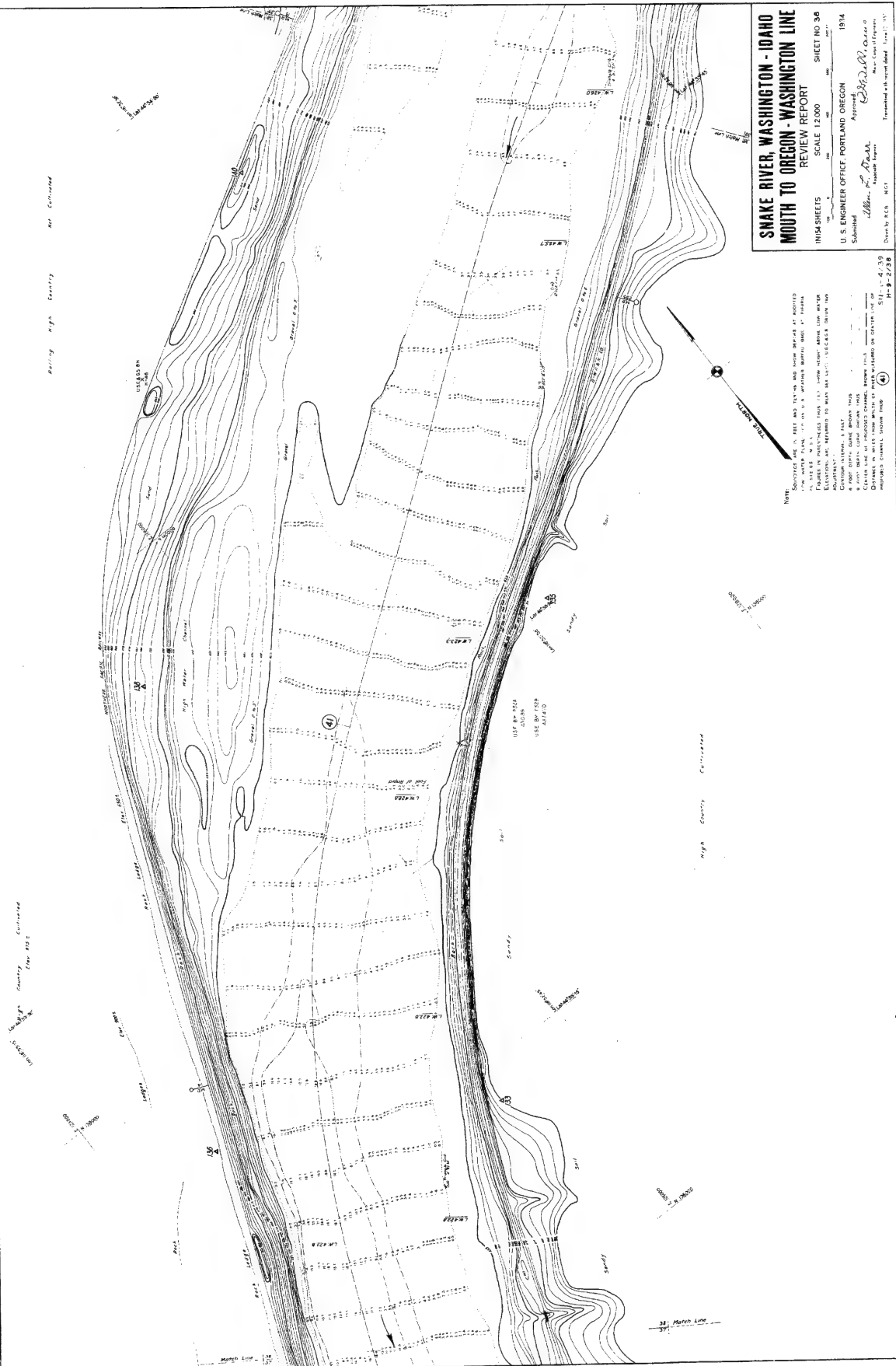
U. S. ENGINEER OFFICE, PORTLAND, OREGON.

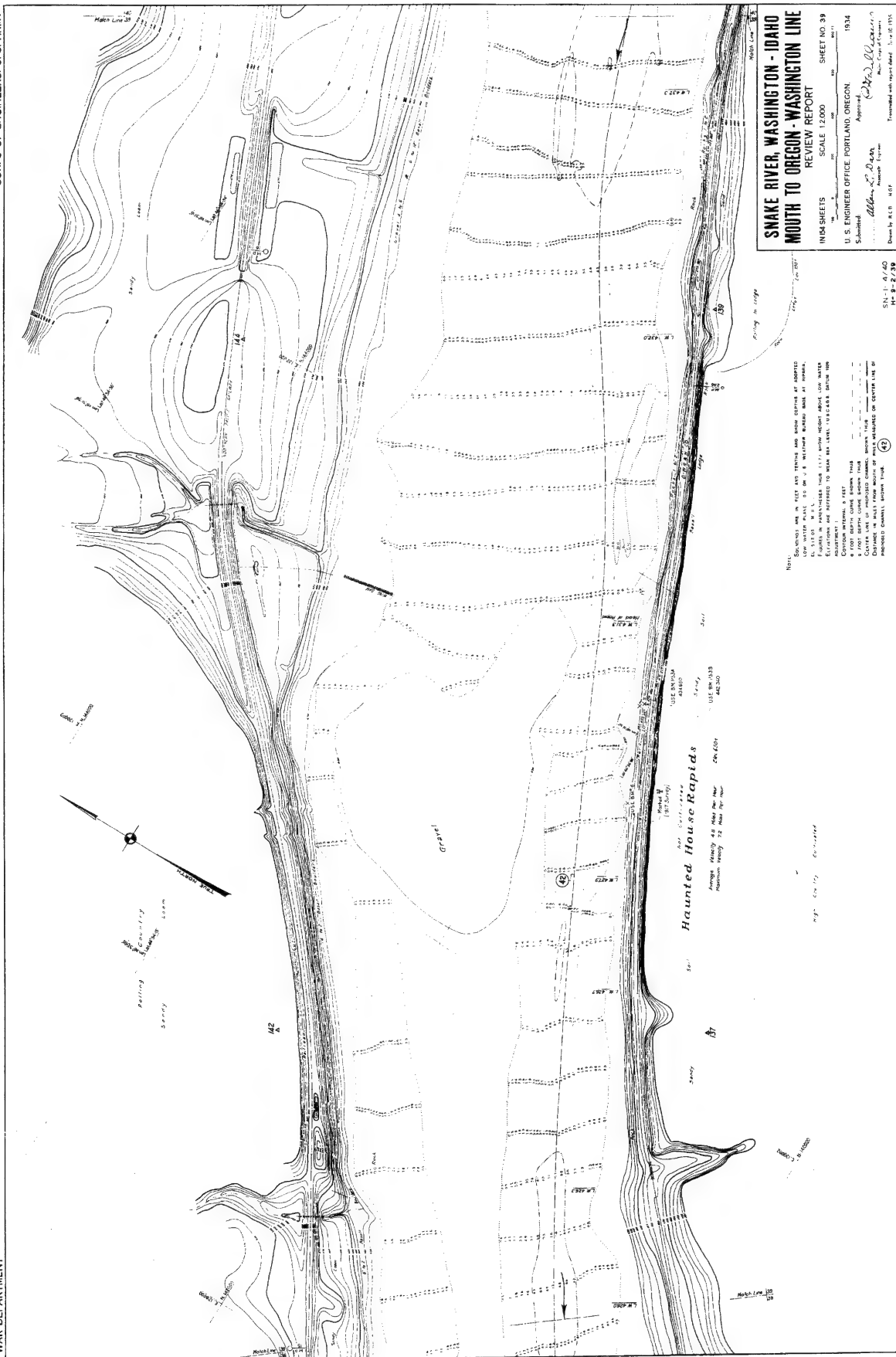
Wm. L. Dan
Hunt. L. L. Jones

Agnes M. Egan
Major, Corps of Engineers
Trenton, N.J.
M.G.F.
Dennis Lee M.C.B.
Dennis Lee M.C.B.

[illegible]

SN-1-12/3/





SNAKE RIVER, WASHINGTON - IDAHO
 MOUTH TO OREGON - WASHINGTON LINE

IN 154 SHEETS
SCALE 1:2,000
REVIEW REPORT
SHEET NO. 39

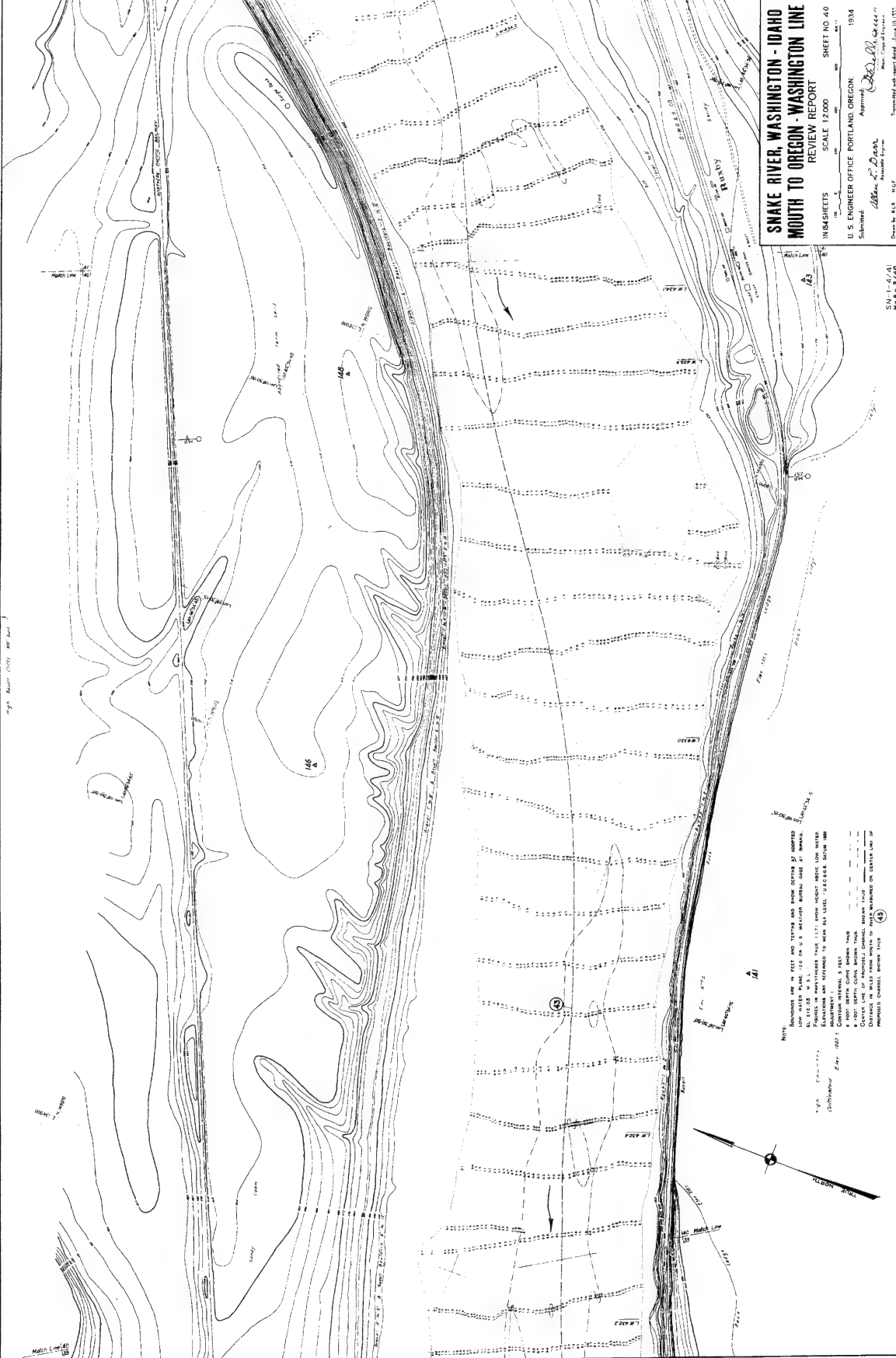
U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934

Submitted: Alvin L. Barr Approved: (Signature)

Transmitted with report dated Nov 10 1955

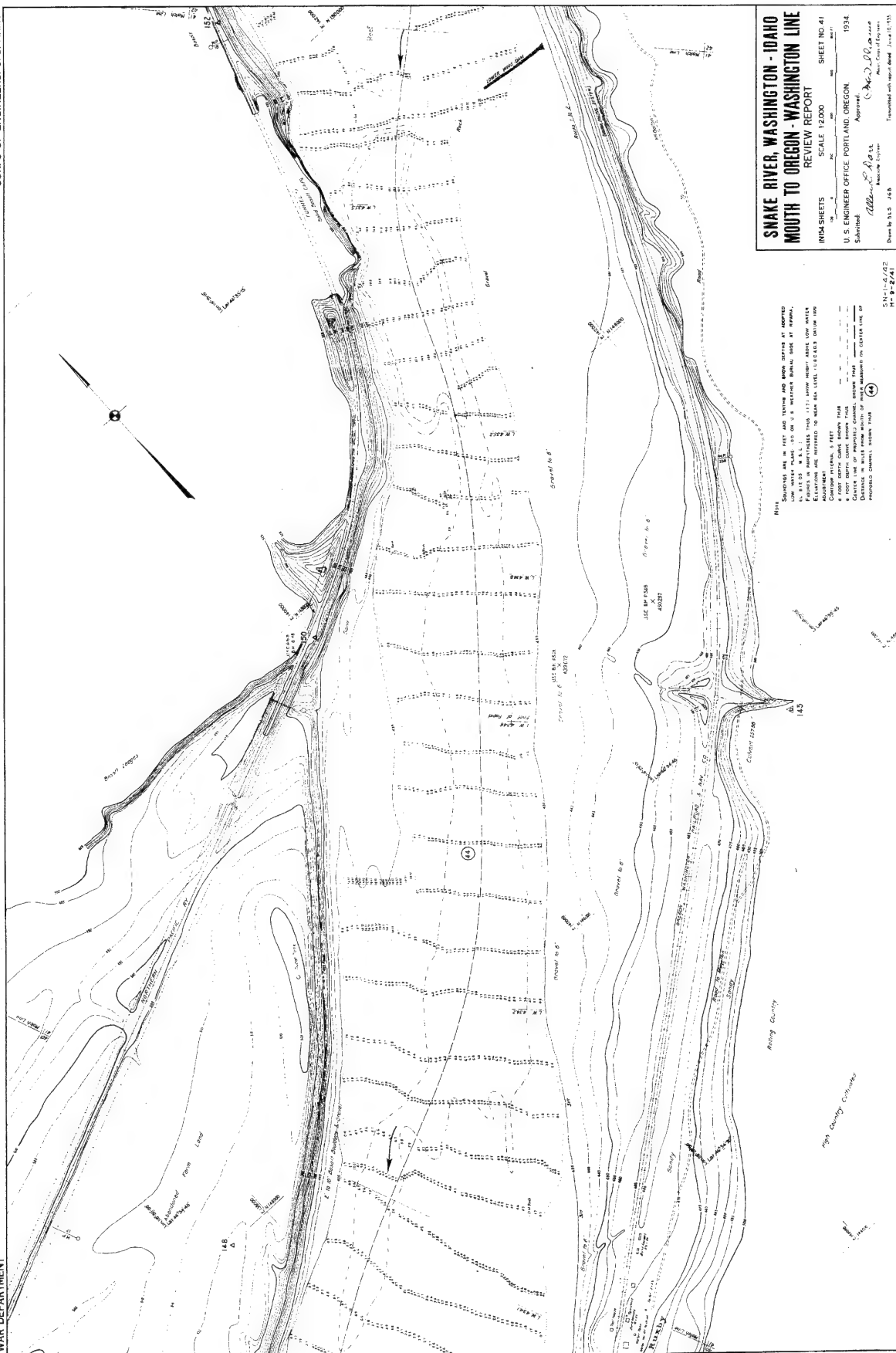
SN-12/39

SN-1. 4/40
H- 9-2/39



Snake River, Washington - Idaho Mouth to Oregon - Washington Line
 REVIEW REPORT
 SHEET NO. 40
 U. S. ENGINEER OFFICE PORTLAND, OREGON
 Submitted: *Wm. F. Dunn*
 Approved: *Wm. F. Dunn*
 Drawn by: R.L.B. N.C.P.
 Transmitted with report dated June 10, 1937
 SN-1-12740

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SNAKE RIVER, WASHINGTON - IDAHO
 MOUTH TO OREGON - WASHINGTON LINE

UNISA SHEETS SCALE 1:2000 SHEET NO 41

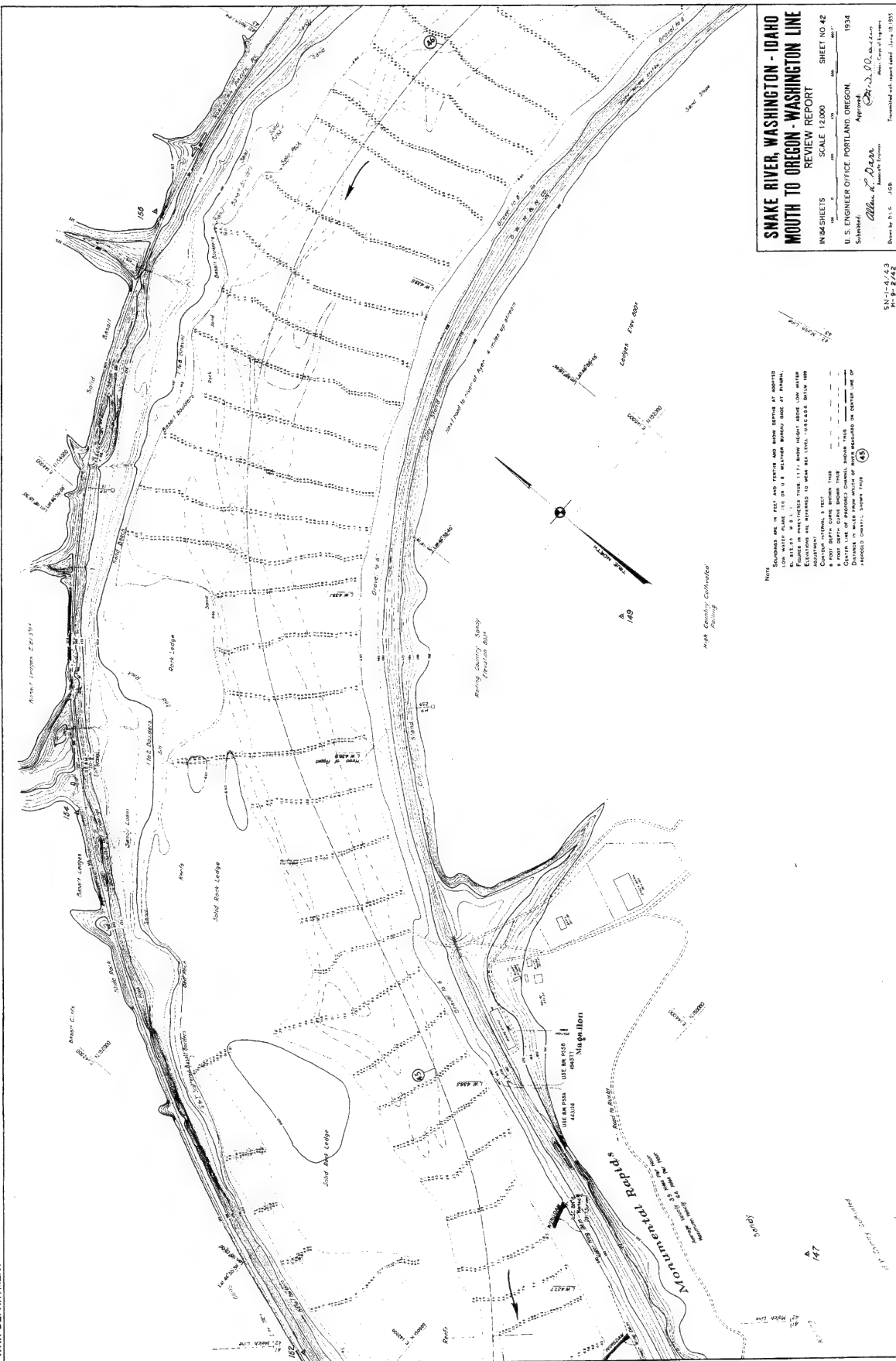
100 0 200 400 600 800 FT

U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934.

Submitted: *Alleen L. Gore* Approved: *(Arlene L. Gore)*

Drawn by 515 JGB
Associate Engineer
Major, Corps of Engineers
Transmitted with report dated June 10, 1935

SN-1-4/42
H-9-2/41

[illegible]

SNAKE RIVER, WASHINGTON - IDAHO
 MOUTH TO OREGON - WASHINGTON LINE
 REVIEW REPORT
 IN 54 SHEETS
 SCALE 1:2,000
 SHEET NO. 42

U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934

Submitted: _____

Approved: _____

Allen L. Darr
Associate Engineer

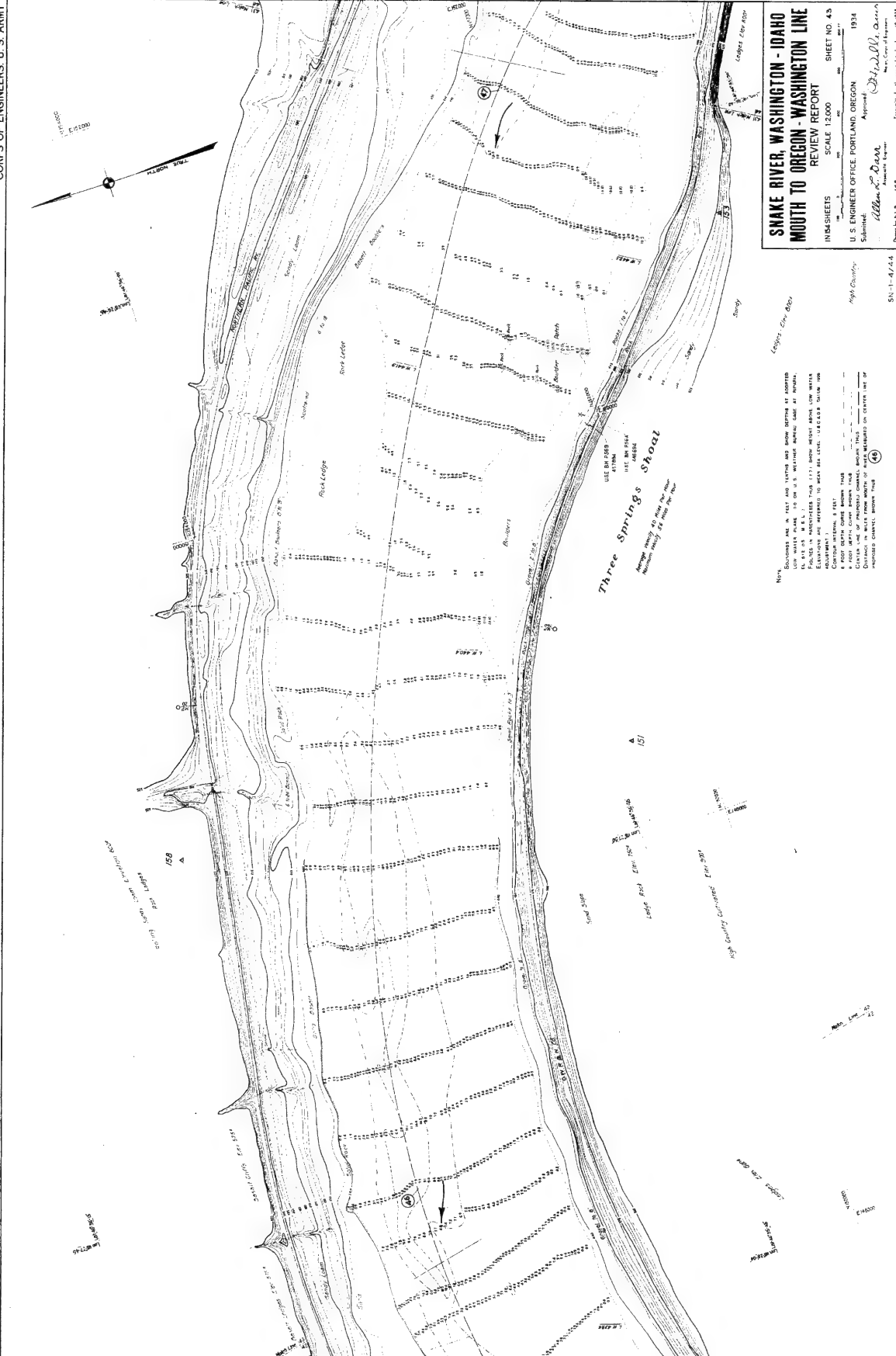
Frank J. O'Connell
Chief, Corps of Engineers

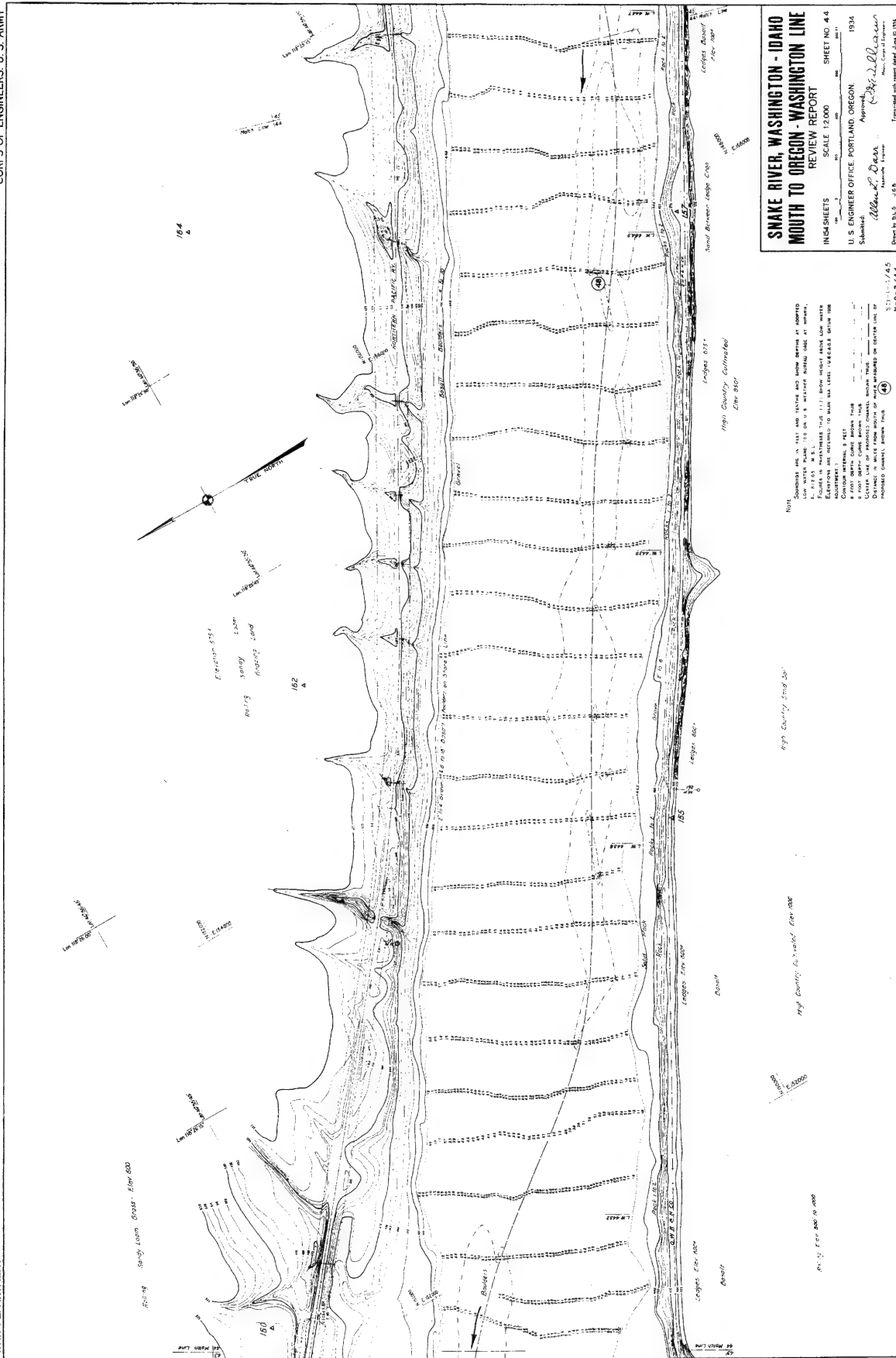
Transmitted with request dated June 10, 1934

Drawn by P.L.S. J.G.D.

SN-1-4/43

SN-1-12/42





**SNAKE RIVER, WASHINGTON - IDAHO
MOUTH TO OREGON - WASHINGTON LINE**
REVIEW REPORT

140 0 100 200 300 400 500 600 700 800 900 1000
 U. S. ENGINEER OFFICE, PORTLAND, OREGON. 1934
 1154 SHEETS SCALE 1:2,000 SHEET NO. 44

Submitted: Alfred L. Darr Associate Engineer
Approved: W. H. Williams Major, Corps of Engineers
Transmitted with request dated June 10, 1935.

SN-1-12/44

Annex B

PRE- AND POST-DAM COMPARISON DISPLAYS

TABLE OF CONTENTS

Ice Harbor

3 Island & Levey Park Area
19 Mile & Fish Hook Park Area
Couch Island Area
The Narrows Area
Sheffler Area
Windust Park Area

Lower Monumental

Monumental Rock Area
Skookum Area
Ayer Area
55 Mile Area
Lyon's Ferry Area
Tucannon River Confluence Area
Riparia Area

Little Goose

Little Goose Dam Area
Goose Island Area
New York Bar Area
Willow Bar Area
Penawawa Area
Shultz Bar Area
Atwood Area
Almota Area

Lower Granite

Lower Granite Dam Area



1958 aerial photograph of 3 Island and Levey Park area.



1991 aerial photograph of 3 Island and Levey Park area.



Photo 1. Left Bank, 3 Island area, 1958 oblique.



Photo 2. Left Bank, 3 Island area, 1958 oblique.

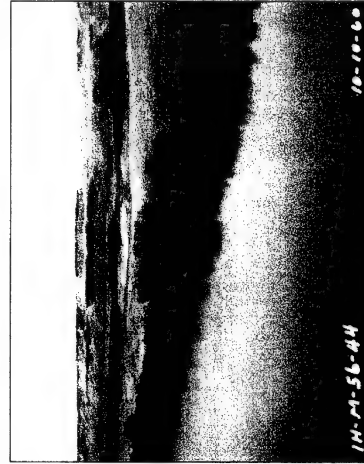
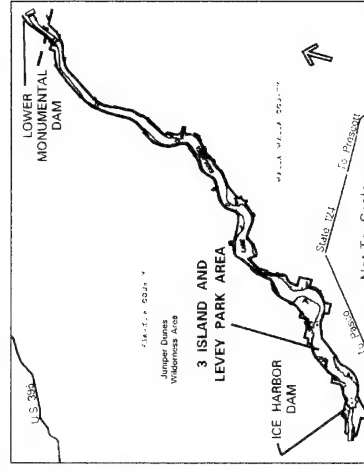


Photo 3. Left Bank, 3 Island area, 1958 oblique.



12/755

1. Numbered brackets on 1958 aerial photograph (modals) represents approximate location and direction of oblique photograph. Number represents numbered oblique image.

12/755



DRAFT
LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

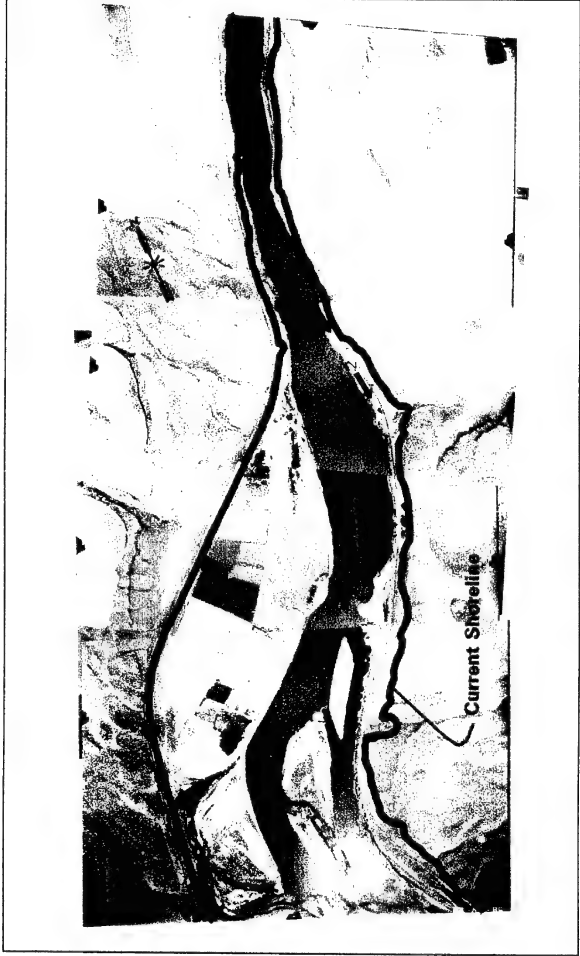
3 Island & Levey Park Area PRE & POST DAM COMPARISON

1999

Copyright © 1999 by the U.S. Army Corps of Engineers, Portland, Oregon



1991 aerial photography of 19 Mile and Fish Hook Park area.



1958 aerial photography of 19 Mile and Fish Hook Park area.

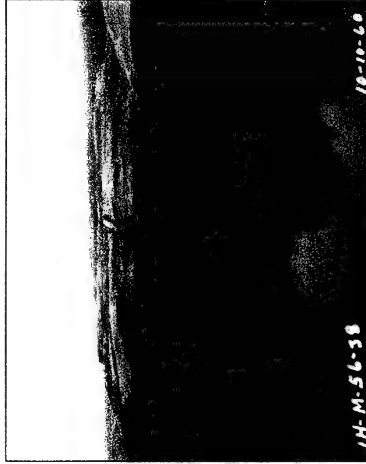
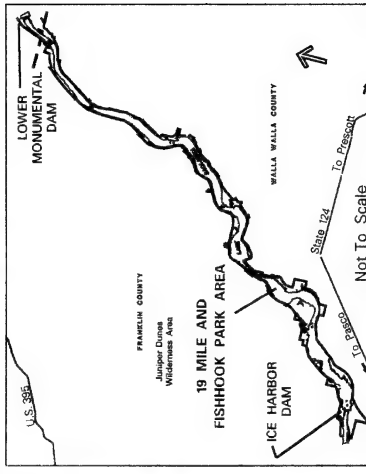


Photo 3. Left Bank, 19 Mile area, 1958 oblique.

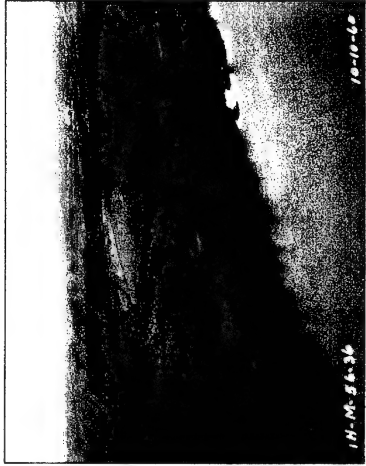


Photo 2. Left Bank, 19 Mile area, 1958 oblique.

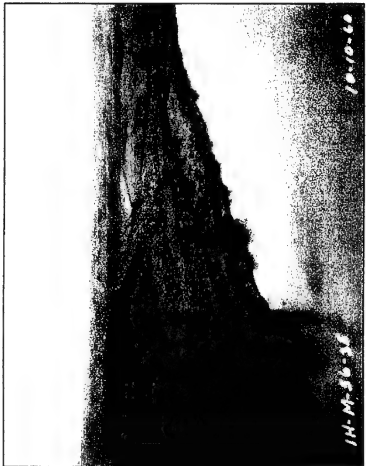


Photo 1. Left Bank, 19 Mile area, 1958 oblique.

NOTES:

1. Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.

Sheet 1/4A



DRAFT LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

19 Mile & Fish Hook Park Area PRE & POST DAM COMPARISON

19-M-56-35, 19-M-56-36, 19-M-56-38, 19-M-56-39, 19-M-56-40, 19-M-56-41, 19-M-56-42, 19-M-56-43, 19-M-56-44, 19-M-56-45, 19-M-56-46, 19-M-56-47, 19-M-56-48, 19-M-56-49, 19-M-56-50, 19-M-56-51, 19-M-56-52, 19-M-56-53, 19-M-56-54, 19-M-56-55, 19-M-56-56, 19-M-56-57, 19-M-56-58, 19-M-56-59, 19-M-56-60, 19-M-56-61, 19-M-56-62, 19-M-56-63, 19-M-56-64, 19-M-56-65, 19-M-56-66, 19-M-56-67, 19-M-56-68, 19-M-56-69, 19-M-56-70, 19-M-56-71, 19-M-56-72, 19-M-56-73, 19-M-56-74, 19-M-56-75, 19-M-56-76, 19-M-56-77, 19-M-56-78, 19-M-56-79, 19-M-56-80, 19-M-56-81, 19-M-56-82, 19-M-56-83, 19-M-56-84, 19-M-56-85, 19-M-56-86, 19-M-56-87, 19-M-56-88, 19-M-56-89, 19-M-56-90, 19-M-56-91, 19-M-56-92, 19-M-56-93, 19-M-56-94, 19-M-56-95, 19-M-56-96, 19-M-56-97, 19-M-56-98, 19-M-56-99, 19-M-56-100

PROJECT: 19-Mile Area 10/27

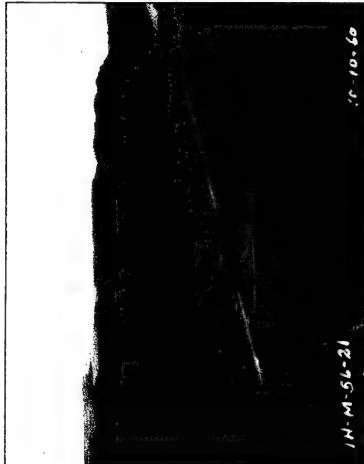
1999



1958 aerial photograph of Couch Island area.



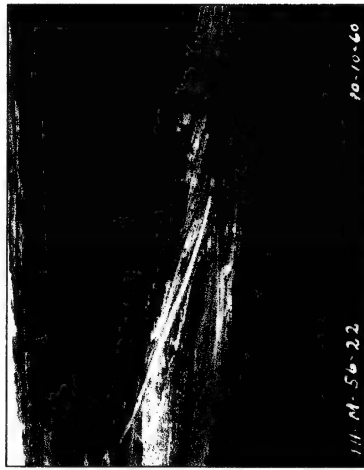
1991 aerial photograph of Couch Island area.



14-M-56-21

10-10-60

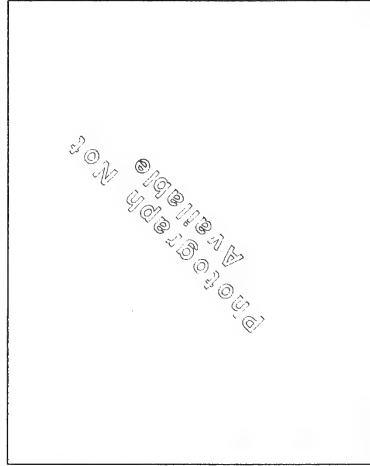
Photo 1. Left Bank, Couch Island area, 1958 oblique.



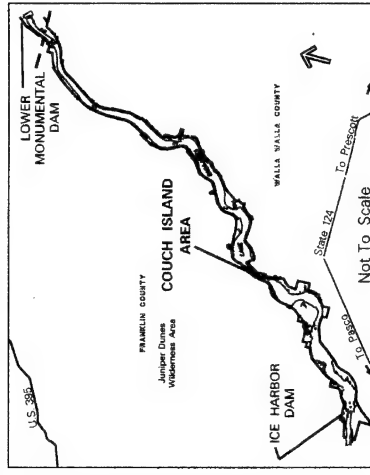
14-M-56-22

10-10-60

Photo 2. Left Bank, Couch Island area, 1958 oblique.



Photograph Not Available



NOTES:

1. Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.
- 2.

Source:

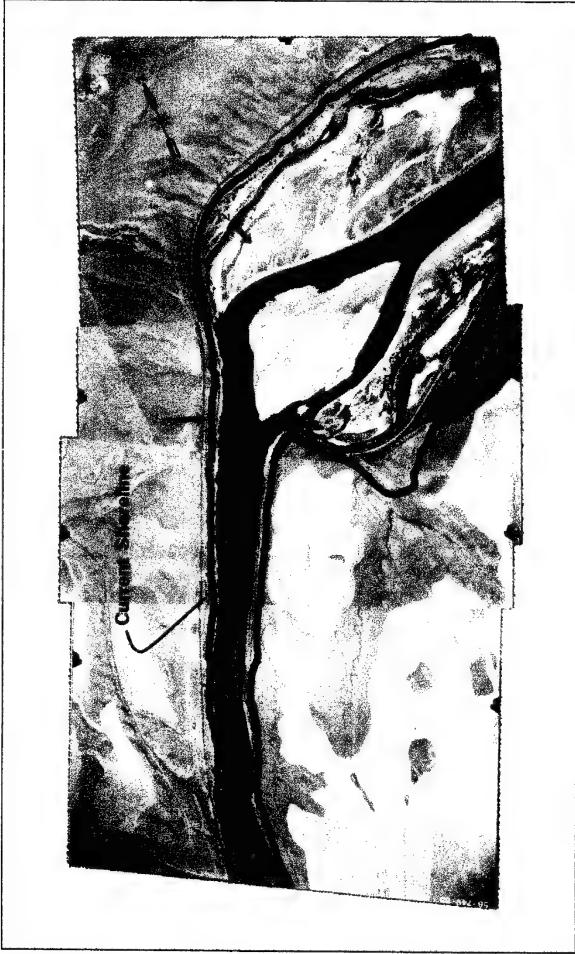


DRAFT LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

Couch Island Area PRE & POST DAM COMPARISON

Prepared by: [Name]
Date: [Date]
Project: [Project Name]
Scale: 1:50,000

1999



1958 aerial photograph of The Narrows area.



1991 aerial photograph of The Narrows area.



Photo 1. Left Bank, The Narrows area, 1958 oblique.

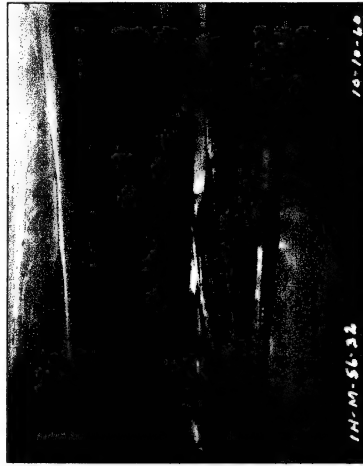


Photo 2. Left Bank, The Narrows area, 1958 oblique.

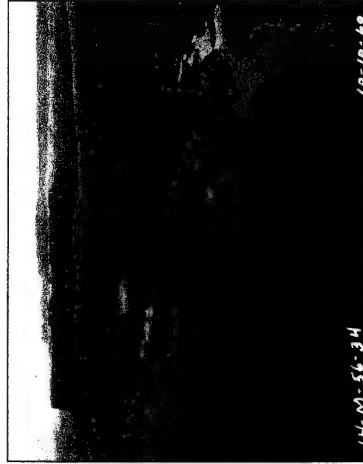
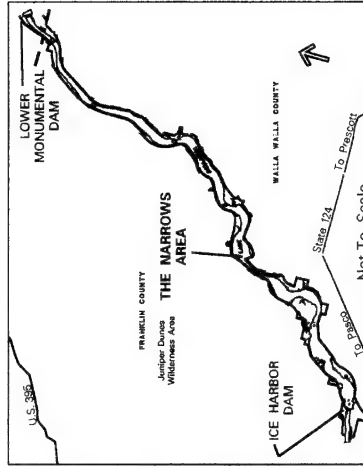


Photo 3. Left Bank, The Narrows area, 1958 oblique.



- NOTES:
1. Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.
 - 2.

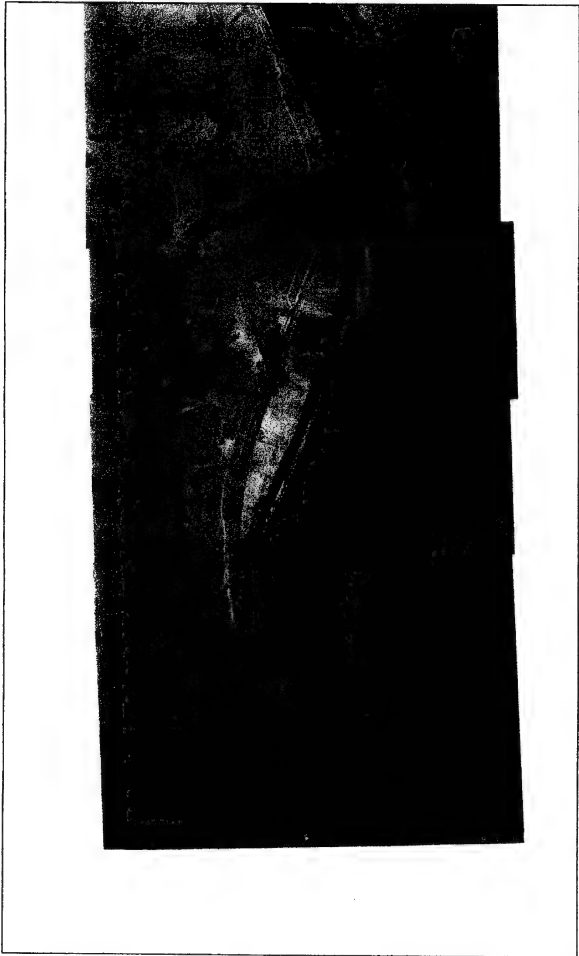
5/11/11



DRAFT LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

The Narrows Area PRE & POST DAM COMPARISON

U.S. GEOLOGICAL SURVEY
BIOLOGICAL SERVICES
SALMON & ANADROMOUS FISHERIES
SPECIAL STUDIES SECTION
3450 RIVERSIDE AVENUE
BOZEMAN, MONTANA 59717-2498
PHOTOED 25-402-1988 10 13
1999



1958 aerial photograph of Windust Park area.



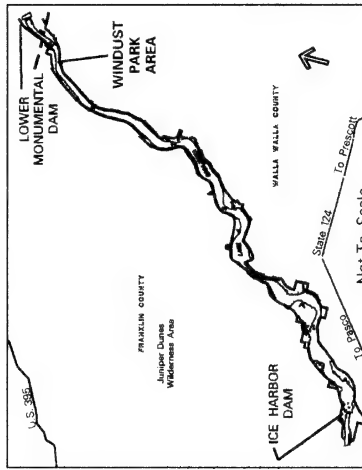
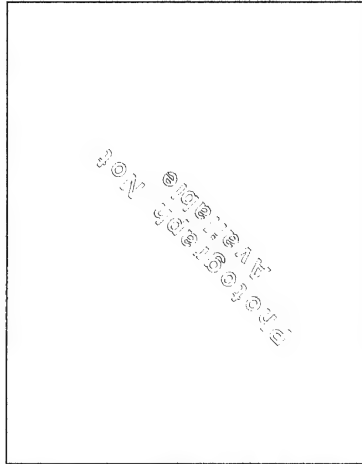
1991 aerial photograph of Windust Park area.



Photo 1. Left Bank, Windust Park area, 1958 oblique.



Photo 2. Left Bank, Windust Park area, 1958 oblique.



NOTES:

1. Numbered arrows on 1958 aerial photograph indicate approximate approximate location and direction of oblique photography. Number represents numbered oblique image.
- 2.

5/11/1991

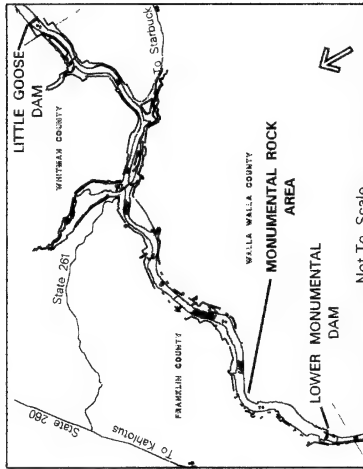
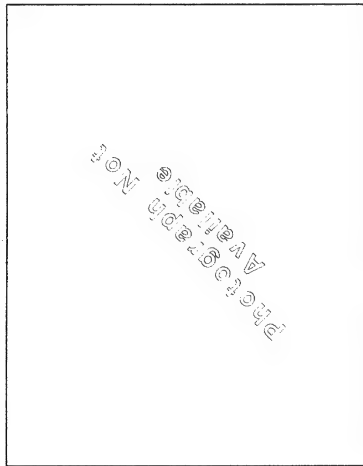
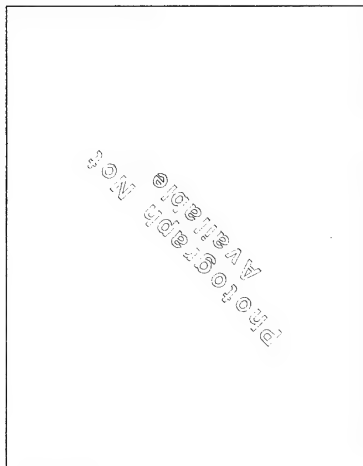
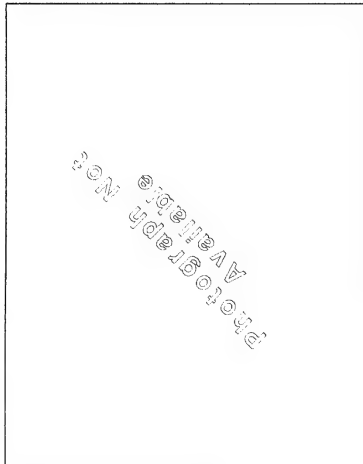
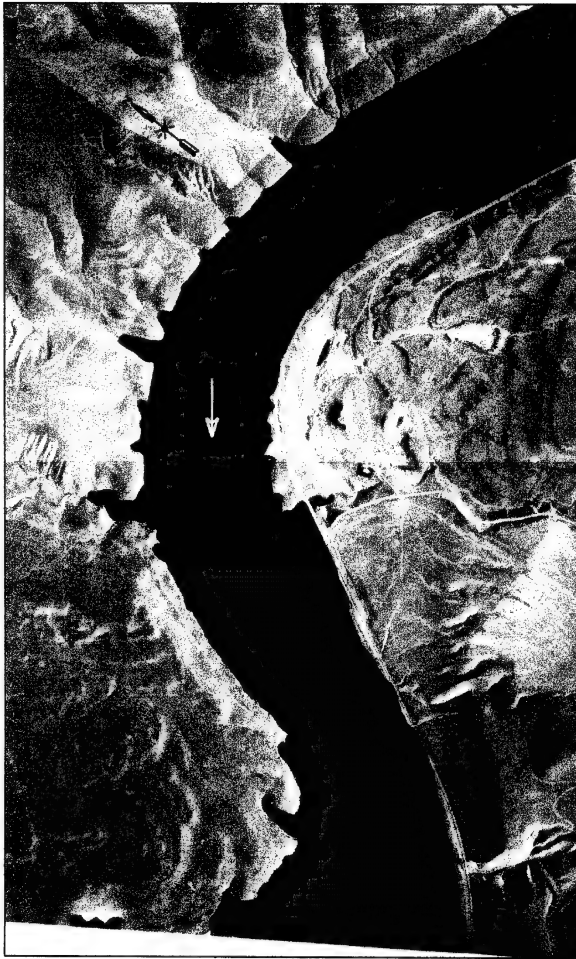
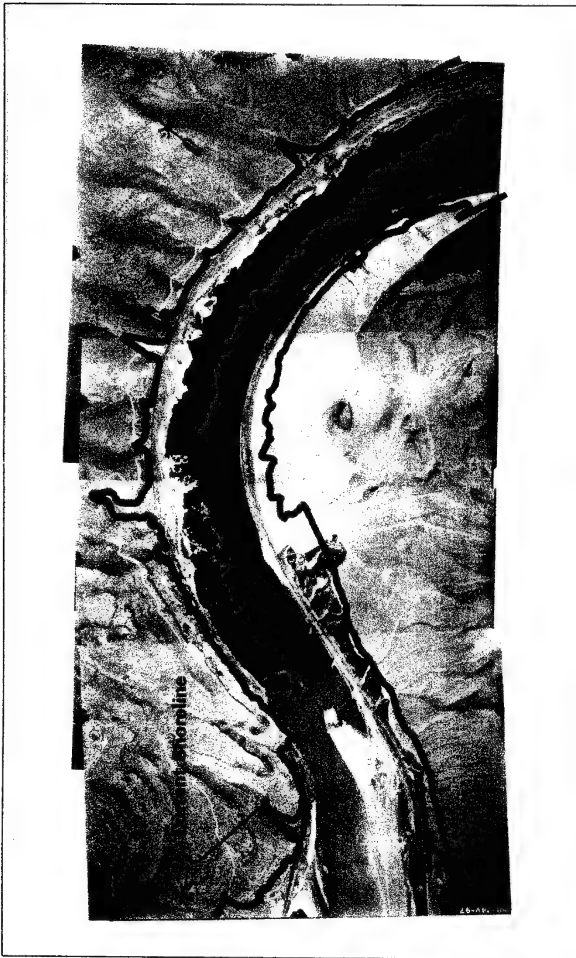


DRAFT LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

Windust Park Area **PRE & POST DAM COMPARISON**

10/11/90 2:00 PM 10/11/90 10:00 AM
10/11/90 2:00 PM 10/11/90 10:00 AM
10/11/90 2:00 PM 10/11/90 10:00 AM

1999



NOTES:

- i. Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.

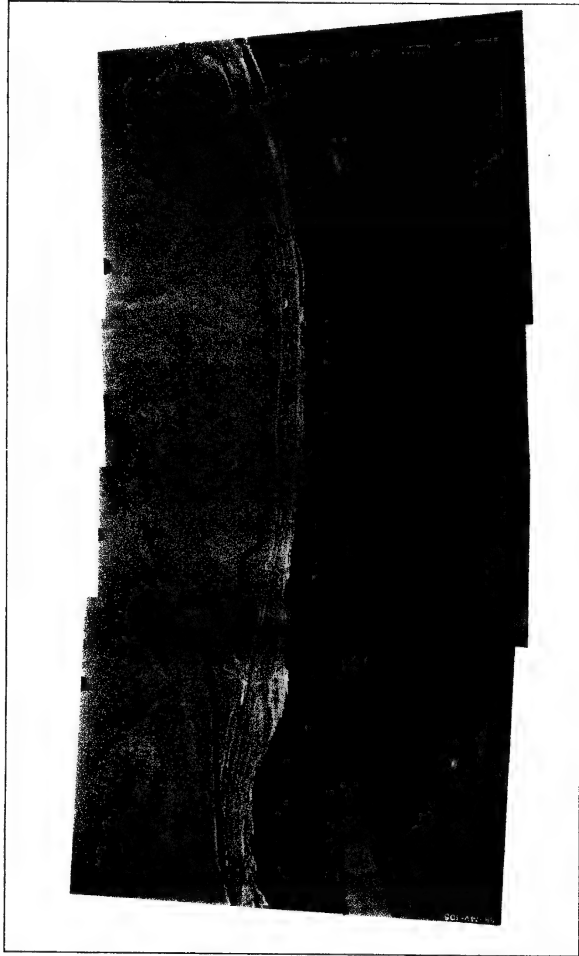
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DRAFT **LOWER SNAKE RIVER**
Juvenile Salmon Migration Feasibility Study

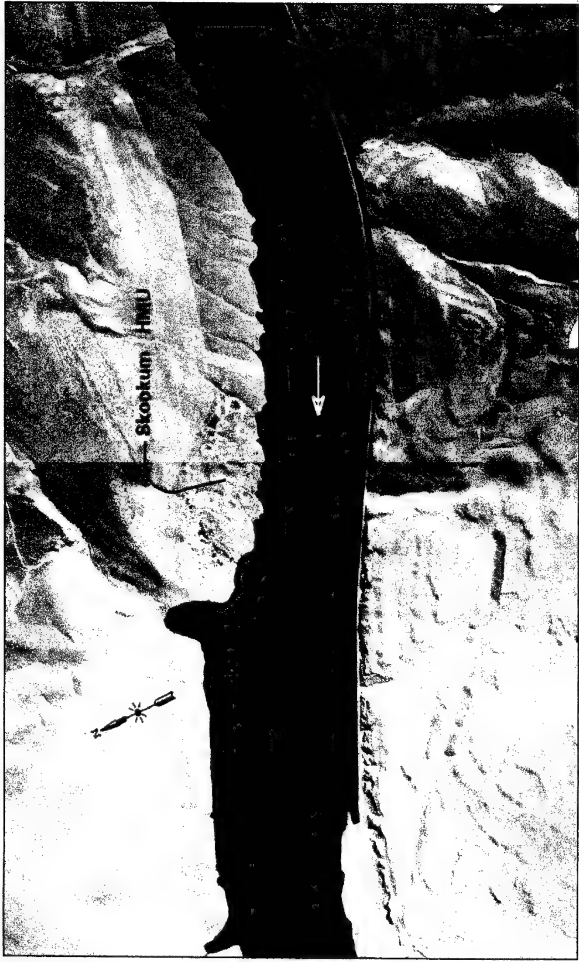
PRE & POST DAM MONUMENTAL ROCK AREA COMPARISON

EVS ANALYSTS & GRAPHIC ASSISTANTS / INTERVIEW TIPS (EVS Analyst-Ph.D.E., AT,
GIS Applications Coordinator, INMTC, from ICE West Bay Ph.D.C., AT)
Study Manager: Melissa Gross (CELENAH, Ph.D., AT)

PL 01/10-22-NOV-1999 14:19



1958 aerial photograph of Skookum area.



1992 aerial photograph of Skookum area.



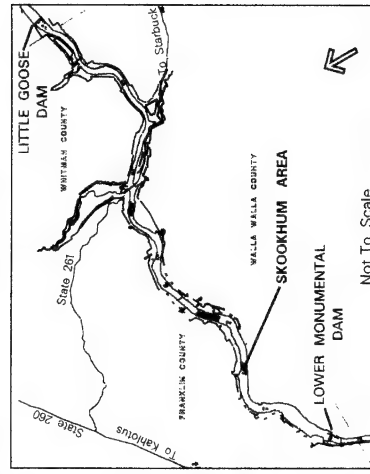
Photo 1. Right Bank, Skookum area, 1958 oblique.



Photo 2. Left Bank, Skookum area, 1958 oblique.



Photo 3. Left Bank, Skookum area, 1958 oblique.



Not To Scale

NOTES:

1. Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.
- 2.

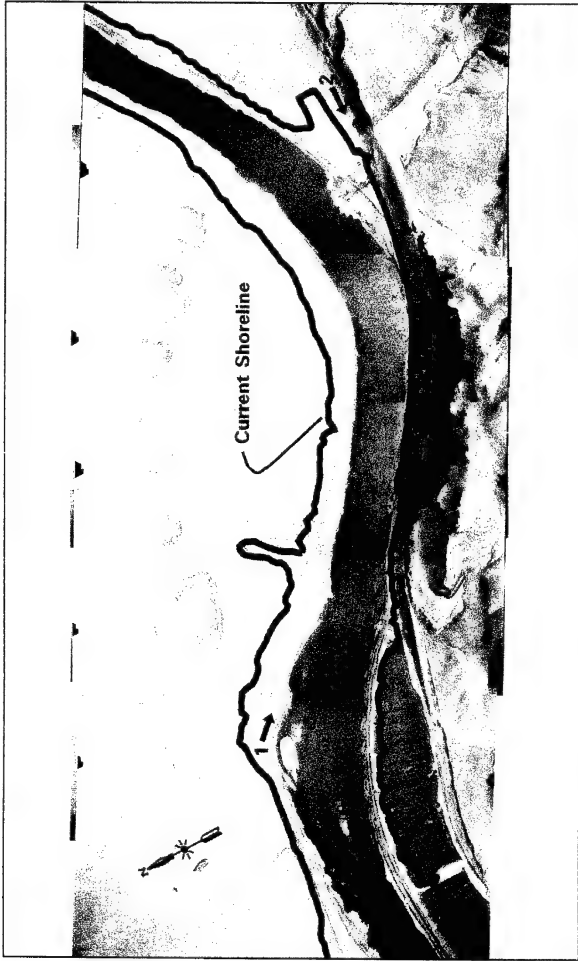
Source:



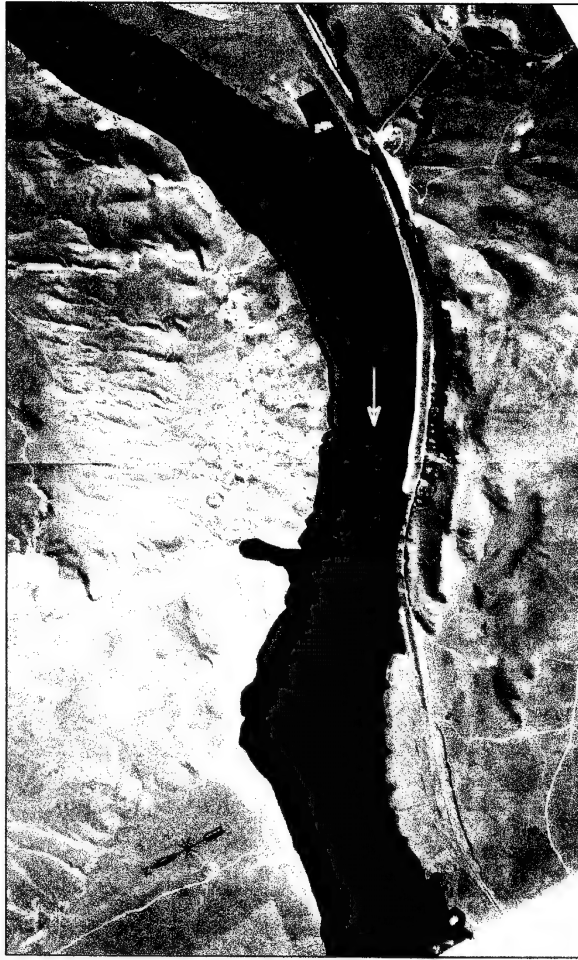
DRAFT LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

PRE & POST DAM Skookum Area COMPARISON

NOAA Technical Memorandum NMFS-360-11-11
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Silver Spring, Maryland 20910
PLOTTED: 23-NOV-1999 11:08



1958 aerial photograph of 55 Mile area.



1992 aerial photograph of 55 Mile area.



Photo 1. Right Bank, 55 Mile area, 1958 oblique.



Photo 2. Left Bank, 55 Mile area, 1958 oblique.

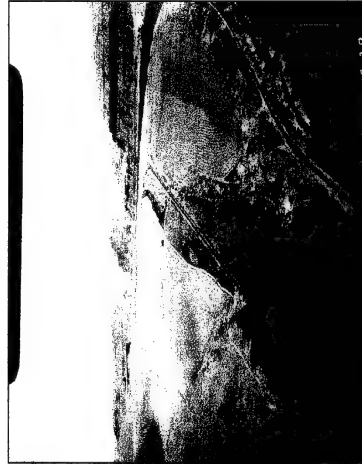
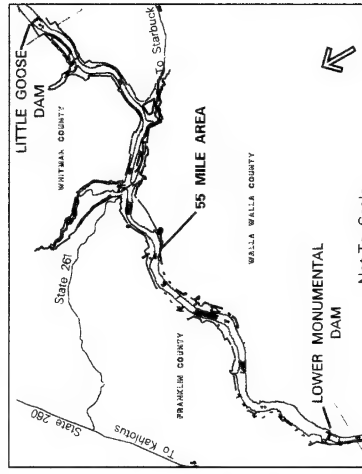


Photo 3. Left Bank, 55 Mile area, 1958 oblique.



- NOTES
1. Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.
 - 2.

Continued.



DRAFT LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

55 Mile Area PRE & POST DAM COMPARISON

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
PORTLAND, OREGON 97201-0001
PROJECT NO. 10-1-100-1000-1000
SCALE 1:50,000
DATE 10/1/99



1958 aerial photography of Lyon's Ferry area.



1992 aerial photography of Lyon's Ferry area.



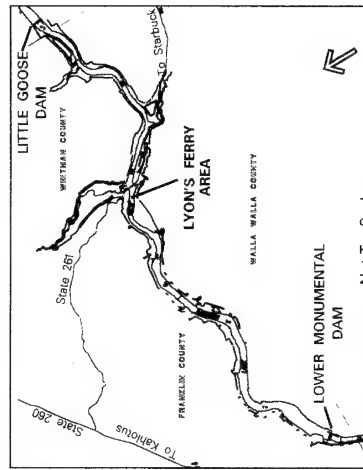
Photo 1. Right Bank, Lyon's Ferry area, 1958 oblique.



Photo 2. Right Bank, Lyon's Ferry area, 1958 oblique.



3. Left Bank, Lyon's Ferry area, 1958 oblique.



Not To Scale

NOTES:

1. Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.

DRAFT **LOWER SNAKE RIVER**
Juvenile Salmon Migration Feasibility Study

PRE & POST DAM COMPARISON

OS Architects & Growth Assembly Applied Technology Team (OS@growth.asap.co.uk)
OS Applications Core developer: Brian Green (brian.green@os.co.uk)
Study Manager: Boris Green (Boris.Green@os.co.uk)

1999



¹ Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.

DOWNSTREAM LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

Tucannon River Confluence Area PRE & POST DAM COMPARISON

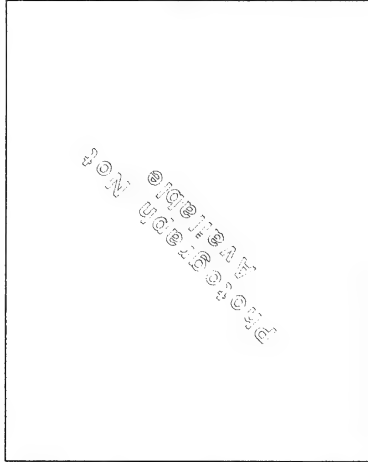
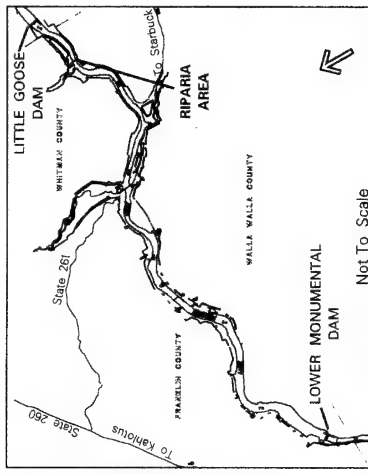
PL 01707 25400, WMA 5.3, 1999

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All rights reserved. Printed in the United States of America.

Q15 ANALYSTS & GRADUATE ASSISTANTS: ADDING TECHNOLOGY TO NON-TECHNICAL AND PQ15-217)
Q15 Applications Coordinator, Bridge to Green (CE/energy and PQ15-217)
Study manager, Bridge to Green (CE/energy and PQ15-217)
Call: 01442 303031 (ext. 100) or 01442 303032 (ext. 100)



1992 aerial photograph of Riparia area.



Source:



DRAFT LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

Riparia Area PRE & POST DAM COMPARISON

1992 Aerial Photograph of Riparia Area
Scale: 1 inch = 1 mile
1992 Aerial Photograph of Riparia Area
Scale: 1 inch = 1 mile



1958 aerial photograph of Riparia area.



Photo 2. Left Bank, Riparia area, 1958 oblique.

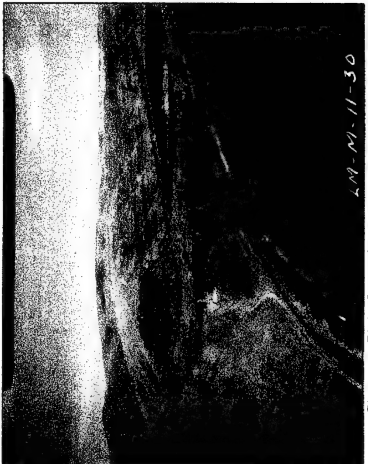


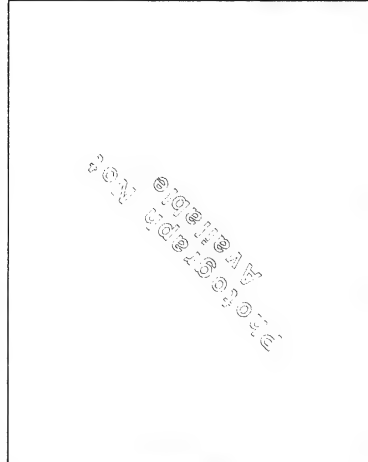
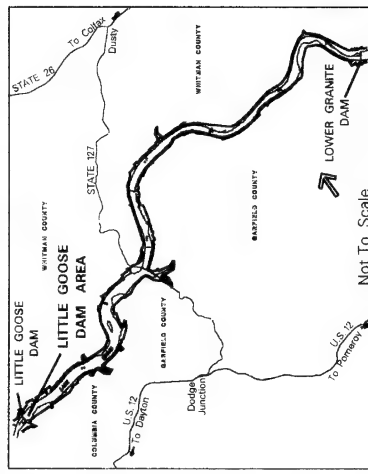
Photo 1. Right Bank, Riparia area, 1958 oblique.

NOTES

1. Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.
- 2.



1992 aerial photograph of Little Goose Dam area.



5/2/94



DRAFT LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

Little Goose Dam Area PRE & POST DAM COMPARISON

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
SPECIAL STUDIES BRANCH
PORTLAND, OREGON 97201
PLATTED 12-NOV-1998 14:03
1999



1958 aerial photograph of Little Goose Dam area.



Photo 2. Right Bank, Little Goose Dam area, 1958 oblique.



Photo 1. Right Bank, Little Goose Dam area, 1958 oblique.

NOTES

1. Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.
- 2.



1958 aerial photograph of Goose Island area.



1992 aerial photograph of Goose Island area.



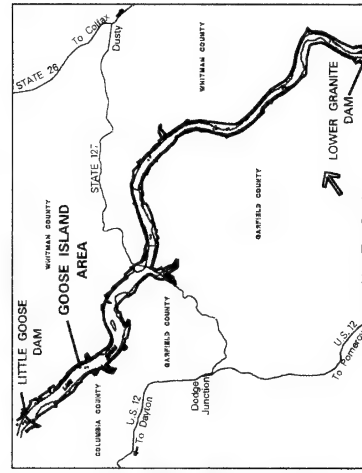
Photo 1. Right Bank, Goose Island area, 1958 oblique.



Photo 2. Right Bank, Goose Island area, 1958 oblique.



Photo 3. Left Bank, Goose Island area, 1958 oblique.



NOTES:
1. Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.
2.

Shoreline



DRAFT LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

Goose Island Area PRE & POST DAM COMPARISON

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1958 aerial photography of New York Bar area.



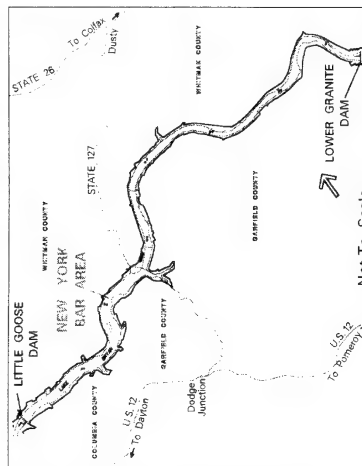
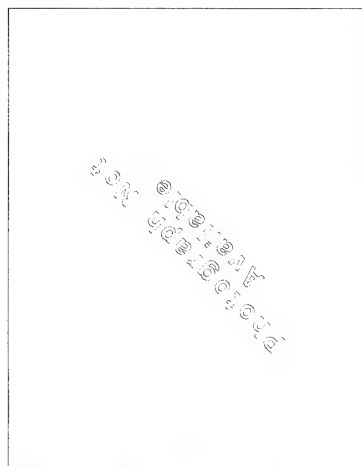
1992 aerial photography of New York Bar area.



Photo 1. Right Bank, New York Bar area, 1958 oblique.



Photo 2. Right Bank, New York Bar area, 1958 oblique.



NOTES:

1. Numbered arrows on 1968 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.

LOWER SNAKE RIVER Juvenile Salmon Migration Feasibility Study

**PRE & POST DAM
COMPARISON**

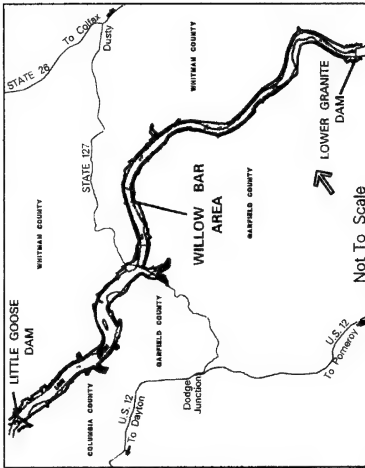
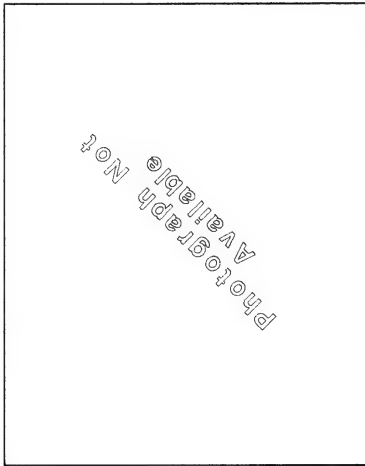
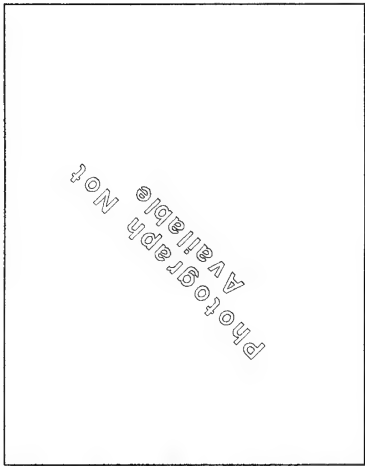
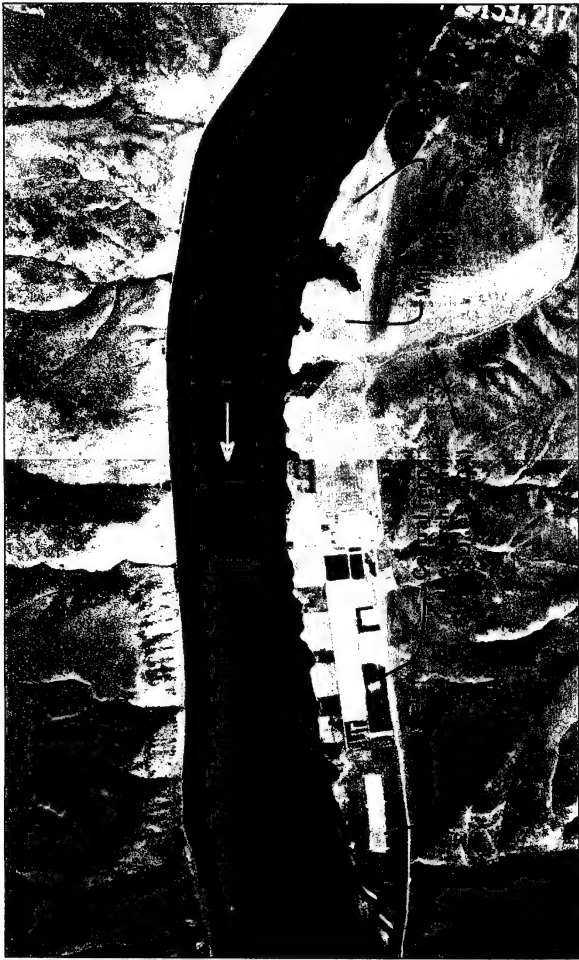
New York Bar Area

1989

PG 4-87

© 1989 by The American Bar Association

ES Analyzers & Graphic Assembly Technology, 2000 ICC Drive, 1st Fl. PO Box 171,
St. Augustine, FL 32085-0171, USA
S. Applications Coordinator, 910 S. Greene, ICC Building, PO Box 287,
St. Augustine, FL 32085-0287, USA
T. Sales Manager, 2000 ICC Drive, St. Augustine, FL 32085-0171, USA
E. Sales Manager, 2000 ICC Drive, St. Augustine, FL 32085-0171, USA
Fax: 904/286-2000
Internet: <http://www.esa.com>



NOTES:

. Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.

Source:

DRAFT **LOWER SNAKE RIVER**
Juvenile Salmon Migration Feasibility Study

Willow Bar Area PRE & POST DAM COMPARISON

Study Manager: Wilfred Brown (PC Health, Inc., MD, E, A*)

1999



1958 aerial photography of Penawawa area.



1992 aerial photography of Penawawa area.



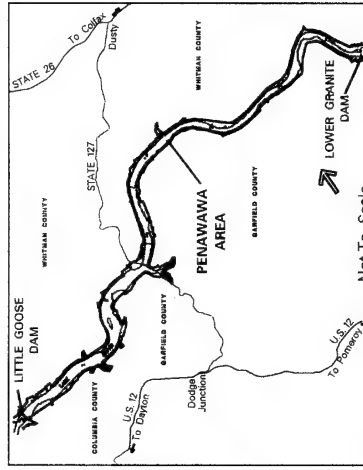
Photo 1. Right Bank, Penawawa area, 1958 oblique.



Photo 2. Right Bank, Penawawa area, 1958 oblique.



Photo 3. Right Bank, Penawawa area, 1958 oblique.



NOTES:

1. Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.
- 2.

Source:



DRAFT LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

Penawawa Area PRE & POST DAM COMPARISON

PROJECT: 20-000-000 1.0
1999



1958 aerial photograph of Shultz Bar area.



1992 aerial photograph of Shultz Bar area.



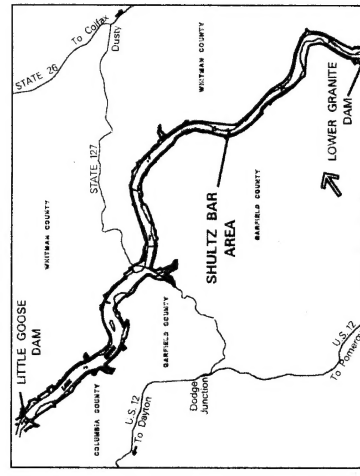
Photo 1. Right Bank, Shultz Bar area, 1958 oblique.



Photo 2. Left Bank, Shultz Bar area, 1958 oblique.



Photo 3. Left Bank, Shultz Bar area, 1958 oblique.



Not To Scale

NOTES:

1. Numbered arrows on 1958 aerial photograph mosaic: represents approximate location and direction of oblique photography. Number represents numbered oblique image.
- 2.

2007/04/04



DRAFT
LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

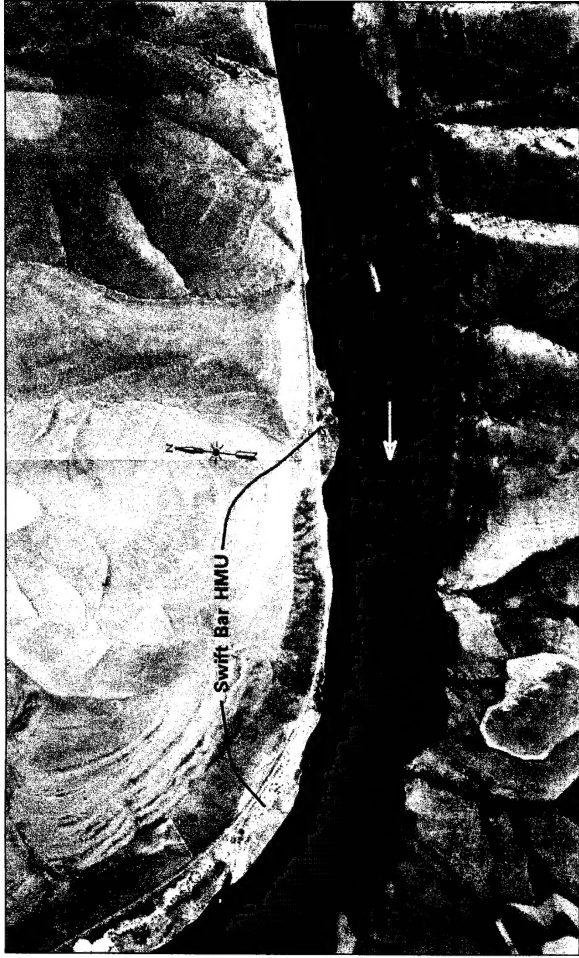
Shultz Bar Area **PRE & POST DAM COMPARISON**

Prepared by: [Name]
Date: [Date]
Project: [Project Name]

PLOTTED: 11/01/00 10:00



1958 aerial photograph of Atwood area.



1992 aerial photograph of Atwood area.



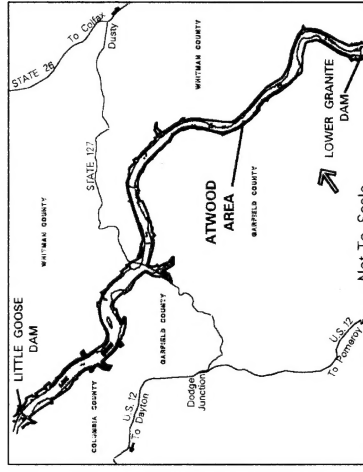
Photo 1. Right Bank, Atwood area, 1958 oblique.



Photo 2. Right Bank, Atwood area, 1958 oblique.



Photo 3. Left Bank, Atwood area, 1958 oblique.



NOTES:
1. Numbered arrows on 1958 aerial photograph mosaic represents approximate location and direction of oblique photography. Number represents numbered oblique image.
2.

Source:



DRAFT LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

PRE & POST DAM Atwood Area COMPARISON

1989



1958 aerial photograph of Almota area.



1992 aerial photograph of Almota area.



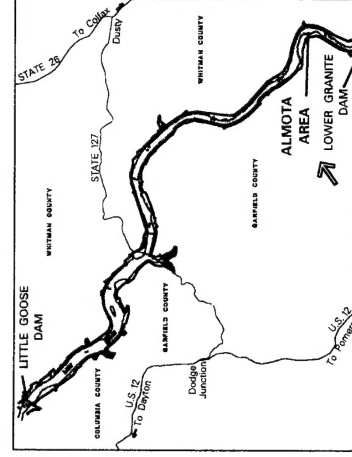
Photo 1. Right Bank, Almota area, 1958 oblique.



Photo 2. Left Bank, Almota area, 1958 oblique.



Photo 3. Left Bank, Almota area, 1958 oblique.



Not To Scale

NOTES:

1. North arrow in 1992 aerial photograph (top left) represents approximate location and direction of oblique photography. Number represents number of oblique images.
- 2.

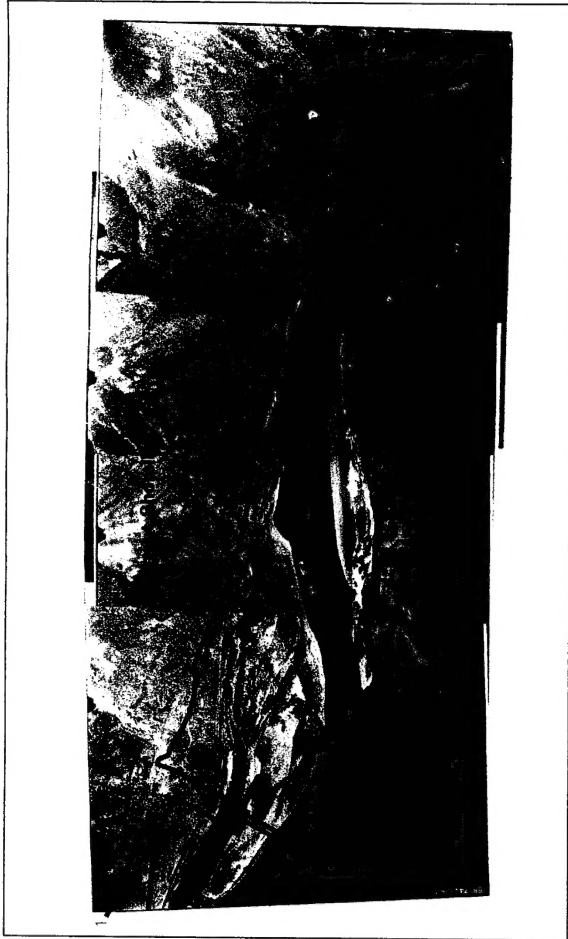


DRAFT
LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

Almota Area PRE & POST DAM COMPARISON

1999

Prepared by: Geographic Information Systems, Inc.
1000 N. 1st Street, Suite 100
Bozeman, MT 59717
Phone: (406) 592-1111
Fax: (406) 592-1112
E-mail: gis@geoinfo.com
WWW: www.geoinfo.com



1958 aerial photograph of Lower Granite Dam area.



1992 aerial photograph of Lower Granite Dam area.



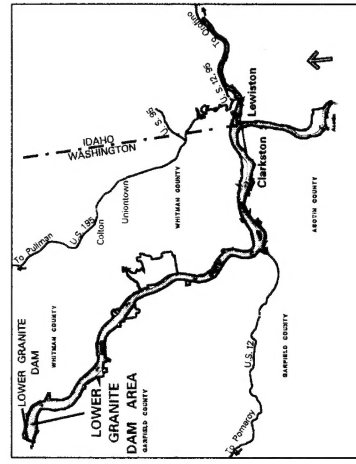
Photo 1. Right Bank, Lower Granite Dam area, 1958 oblique.



Photo 2. Right Bank, Lower Granite Dam area, 1958 oblique.



Photo 3. Left Bank, Lower Granite Dam area, 1958 oblique.



NOTES:

1. Numbered arrows on 1958 aerial photograph indicate approximate location and direction of oblique photography. Number represents numbered oblique image.
- 2.

200000



LOWER SNAKE RIVER
Juvenile Salmon Migration Feasibility Study

Lower Granite Dam Area PRE & POST DAM COMPARISON

U.S. Army Corps of Engineers, Portland, Oregon
Lower Snake River Project, 1958-1992
Lower Snake River Project, 1958-1992
Lower Snake River Project, 1958-1992

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